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ABSTRACT

This report applies a human capital/internal labor market theory of teacher mobility to school districts in the state of Michigan. Previously, this theoretical framework was used to explain teacher mobility within a single school district, the San Diego school system. The report is divided into four sections. Section I, the Introduction, presents a summary of the theoretical framework of the study, a summary of results for San Diego, and a description of the study of the Michigan personnel system. Section II, "Mobility in a State Educational Personnel System," discusses results of the Michigan study. Section III, "Determinants of Teacher Mobility within a State Educational Personnel System," is divided into the following subsections: terminations and moves between districts; the returns to interdistrict transfers; tradeoffs between salaries and district characteristics; moves to administrative and special teaching positions. Section IV presents conclusions drawn from the Michigan study. The appendixes are Supplemental Statistical Results; Determinants of Teachers' Salaries, and Michigan Educational Data. Supportive tables are included throughout the text. (JA)

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# ANALYSIS OF THE EDUCATIONAL PERSONNEL SYSTEM: VII. TEACHER MOBILITY IN MICHIGAN

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## PREFACE

Under Contract OEC-0-71-2533(099) with the U.S. Office of Education, The Rand Corporation has been conducting an analysis of the educational personnel system in the United States. This is the seventh in a series of reports presenting details of Rand's research. This report focuses on the mobility patterns of public school teachers in the State of Michigan. The economic theory and statistical methodology are similar to those presented in the first report of this series.

David H. Greenberg is a member of the Rand research staff. John J. McCall is a Rand consultant.

The other reports in this series are:

David Greenberg and John McCall, *Analysis of the Educational Personnel System: I. Teacher Mobility in San Diego*, R-1071-HEW, January 1973.

David Greenberg and John McCall, *Analysis of the Educational Personnel System: II. A Theory of Labor Mobility with Applications to the Teacher Market*, R-1270-HEW, August 1973.

Stephen J. Carroll, *Analysis of the Educational Personnel System: III. The Demand for Educational Professionals*, R-1308-HEW, October 1973.

Emmett Keeler, *Analysis of the Educational Personnel System: IV. Teacher Turnover*, R-1325-HEW, October 1973.

Kenneth F. Ryder, Jr., and Stephen J. Carroll, *Analysis of the Educational Personnel System: V. The Supply of Elementary and Secondary Teachers*, R-1341-HEW (forthcoming).

Kenneth F. Ryder, Jr., *Analysis of the Educational Personnel System: VI. Staffing Patterns in U.S. Local Public Schools*, R-1342-HEW (forthcoming).

Stephen J. Carroll, David Greenberg, Emmett Keeler, John McCall, and Kenneth F. Ryder, Jr., *Analysis of the Educational Personnel System: VIII. Overview and Summary*, R-1344-HEW (forthcoming).

## SUMMARY

The mobility of teachers to, from, and within school districts can be fully understood only through an examination of social, psychological, economic, and purely random components. Any theory attempting a complete examination of teacher mobility would be as complicated as the phenomena themselves. An extremely simple theory, however, would probably yield an inadequate explanation of teacher mobility. In this report, we hope to achieve a successful balance between simplicity of structure and power of explanation. For this reason we have concentrated on the economic aspects of the mobility decision. The economic framework is designed to analyze teacher mobility in general and to elicit specific hypotheses to be tested within the state of Michigan. Our data cover the movement of teachers in Michigan during the school years between 1967-68 and 1970-71.

The framework for analysis is a melding of the theory of human capital and the theory of internal labor markets within a probabilistic setting. That is, we assume that economic factors combine with the institutional setting to affect decisionmaking in a probablilistic fashion. In particular, a change in an economic variable influences the probability of individual movement. The economic framework is quite general and should be applicable to other labor markets possessing similar institutional structures, such as those found throughout the civil service sector.

In a previous study of the San Diego school system, the observed teacher mobility patterns were consistent, for the most part, with those predicted by the economic framework. Several important implications of the economic framework also are consistent with the empirical analysis of the Michigan data, suggesting that the theory is relatively robust. However, definitive policy recommendations must be postponed until a richer set of data is subjected to more sophisticated analysis. In the meantime, the following results may serve as useful guides.

First, the mobility patterns in Michigan were quite similar to those observed in San Diego. Young, inexperienced teachers were more

likely to leave their school district, either to quit teaching or move to another district, than were more experienced teachers. One explanation for this is that older persons are more likely to have found an occupation (teaching) and a district with which they are satisfied. Moreover, the human capital investments of older, more experienced teachers, both in the education field in general and in their district in particular, are likely to be larger than for less experienced teachers. The results further indicated that young women were more likely to terminate than young men. The difference in the likelihood of termination persisted until age 28, disappearing thereafter. This is also as expected, since young women generally have greater opportunities to engage in useful activities outside the labor force than young men and are considerably less likely to be promoted to an administrative position.

Second, the probability of termination of teachers with advanced degrees was significantly less than for less educated teachers. The investment in specific human capital represented by an advanced degree proved, as expected, a formidable deterrent to termination. This investment also made an important contribution to a teacher's chances of receiving a promotion.

Third, consistent with economic theory, the termination behavior of men and women and the interdistrict mobility of males were all inversely related to their salaries. However, the interdistrict mobility of females was insensitive to the salary variable, indicating that women, possibly because of family obligations, are less able to respond to economic incentives to migrate than men. Teachers also display a tendency to move away from districts with relatively low non-pecuniary returns, as represented by various student characteristics. District student characteristics in fact, appear to be a much more important factor in teacher decisions to terminate or to change districts than do salary considerations.

Fourth, interdistrict moves generally resulted in higher non-pecuniary returns for teachers, in somewhat higher salaries, and in a considerably greater likelihood of promotion.

Fifth, there is little evidence that teacher mobility patterns have much effect on how teachers are allocated among different types

of districts in Michigan. This contrasts with our findings on how teachers are allocated among *schools* in San Diego, where we found strong evidence that schools whose students have characteristics teachers find attractive have faculties with relatively greater experience and education. One reason for different outcomes in Michigan and San Diego is that the flow of teachers among districts is relatively small compared with the flow among schools within a single large district. This is partly because interschool variation in student characteristics within a single large district is usually greater than interdistrict variation within a state. Furthermore, barriers to movement are probably weaker within a district than between districts. Teachers desiring a change in assignments seem to look first within their own district and then to other districts. Interdistrict moves appear most likely to occur where opportunities for intradistrict movement are limited, such as in small districts or for a teacher with a Ph.D.

Finally, districts with certain unattractive non-pecuniary characteristics tend to pay higher salaries. Perhaps this is one reason why teachers who transfer among districts achieve considerable non-pecuniary improvements but relatively small salary increases.

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# I. INTRODUCTION

This report presents some preliminary findings from our analysis of teacher mobility in the State of Michigan. It should be viewed as a companion piece to our study of teacher flows in the San Diego School system.[1] In that study we tested a human capital/internal labor market theory of teacher mobility,[2] using a short (two year) but comprehensive set of longitudinal data on teacher movements in the San Diego School system. In general, these data were consistent with the implications of the theory of teacher mobility. This study provides another test of the theory using a longer (four year) longitudinal data file for a larger and much more heterogeneous educational personnel system, namely the school districts that constitute the Michigan Public School System. As in San Diego, the actual movements of teachers in Michigan closely approximate the mobility behavior predicted by our theory.

In the remainder of this section, we present a concise outline of the theory, followed by a brief discussion of the empirical findings for San Diego. We then contrast our analysis of teacher mobility in Michigan with that for San Diego and enumerate several of the hypotheses that we test with the Michigan data. Section II presents a descriptive analysis of major avenues of movement taken by teachers within Michigan. Section III contains the heart of the empirical analysis, a detailed study of the termination behavior of Michigan teachers, their interdistrict mobility, and their movement into administrative positions. Section IV summarizes the major results and discusses some of their implications.

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[1] See D. Greenberg and J. McCall, *Analysis of the Educational Personnel System: I. Teacher Mobility in San Diego*, R-1071-HEW, The Rand Corporation, January 1973.

[2] For a detailed presentation of this theory of teacher mobility see D. Greenberg and J. McCall, *Analysis of the Educational Personnel System: II. A Theory of Labor Mobility with Applications to the Teacher Market*, R-1270-HEW, The Rand Corporation, April 1973.

## A SUMMARY OF THE THEORETICAL FRAMEWORK[1]

The explanation of teacher mobility among schools within a school district, among districts, and between the school sector and the rest of the economy is facilitated by human capital considerations.[2] One of the major contributions of human capital theory is the recognition that each individual has embodied within him a valuable economic resource, called "human capital," that yields returns over his entire lifetime. Investments in human capital include formal education, vocational training, on-the-job training, movements between jobs, and information accumulation. The distinction between general and specific human capital is a key factor in understanding labor mobility in general and teacher mobility in particular. General human capital encompasses all those investments that bring the same return in all occupations. Specific human capital includes investments that have higher returns in one occupation, one school district, or even in one specific teaching assignment than in any other.

Large investments in specific human capital impede movement from the set of jobs for which the investments are specific. Similarly, movement into this set of jobs is inhibited by specific human capital requirements. These considerations are immediately applicable to teacher mobility. An experienced teacher with graduate degrees in education is less likely to leave the education sector for a job elsewhere than an individual with a smaller investment in teaching. Likewise, a teacher who has acquired extensive knowledge about one school district is less likely to move to another district. And movements among schools within a school district are more likely to be made by teachers with only modest investments in human capital specific to a single school in the district. These human capital barriers to

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[1] Only those parts of the framework most pertinent to the empirical analysis presented in this study are outlined here. For a full discussion of the framework, see Greenberg and McCall, April 1973.

[2] For a complete description of the theory of human capital, see G. Becker, *Human Capital*, National Bureau of Economic Research, New York, 1964.

mobility partition the labor markets into relatively autonomous submarkets known as "internal labor markets."[1]

Internal labor markets are discernible at four levels within the educational sector. The most general concept embraces the entire primary and secondary teaching sector. At this level of generality, the external labor market consists of all nonteaching occupations. Entrants to this market are recent college graduates and former teachers returning from other occupations, most notably housekeeping. Departures are made by retiring teachers and those who change to nonteaching occupations. At the second level of generality are internal labor markets that are defined by state political boundaries. The external market includes all teachers who have not met state certification requirements. At the next level of generality is the interal labor market associated with a particular school district. All other school districts are now included in the external labor market. Although school districts have analogous hierarchical structures, the flow of teachers across districts is obstructed by those investments in human capital that are specific to a single district. An internal labor market also exists at the individual school level. Every occupation outside this school constitutes the external labor market. Once again, investments in human capital specific to the school create barriers to movement between the internal and external markets.

Teachers, like other workers, should tend to flow toward those jobs within their internal labor markets that offer them the highest pecuniary and non-pecuniary returns. Movement within an internal labor market for a single school or school district will depend mostly on non-pecuniary differences, since salaries do not vary among most of

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[1]The internal labor market concept was introduced by Clark Kerr ("The Balkanization of Labor Markets," in E. Wight Bakke *et al.*, *Labor Mobility and Economic Opportunity*, Wiley, New York, 1964 and has been used to analyze the mobility of workers across industries, across firms in a particular industry, and across jobs in a specific firm. (See also P. B. Doeringer and M. J. Piore, *Internal Labor Markets and Manpower Analyses*, D. C. Heath, Boston, 1971; and A. Alexander, *Income, Experience, and the Structure of Internal Labor Markets*, P-4757, The Rand Corporation, January 1972.)

the assignments within these markets.[1] Interdistrict movement, however, should depend on pecuniary as well as non-pecuniary differences. Although pecuniary returns for teachers are measured in terms of salary, non-pecuniary returns have several different dimensions. Among these are an assignment's geographic location, the wealth of district residents, district expenditures on physical facilities and instructional materials, and student characteristics--their socioeconomic background, their attitudes and cognitive ability, and their racial composition. It seems likely that schools or districts that rank high on the basis of these measures are considered by most teachers to offer high non-pecuniary returns. We shall refer to these as "high status" schools or districts and to schools or districts that rank low on the basis of such criteria as "low status."

## A SUMMARY OF RESULTS FOR SAN DIEGO

Several important implications of the theory of teacher mobility received confirmation when tested against the San Diego data. For example, we expected that since most teachers have a middle-class orientation, they would consider as high status schools those schools in which students perform well on standardized cognitive tests and come from white, middle-class backgrounds; and they would prefer to teach at these schools. And, in fact, when we measured school status in terms of these student characteristics, we observed a significant tendency for teachers to move from low status to high status schools.

Second, newly hired teachers have the least knowledge of the school system--an investment in specific human capital--and as outsiders have the least control over the allocation of opportunity within the internal labor market. Thus, we expected them to be placed in the lower status schools. This expectation was confirmed by the San Diego data.

Third, teachers with the most experience should be least likely to move between assignments, since they are most likely to have found a satisfactory assignment in which they have a large investment in

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[1] Promotions into administrative positions do, of course, result in salary changes, but administrative positions are a rather small fraction of total teaching positions.

specific human capital. This hypothesis was consistent with our findings.

Fourth, largely as a consequence of the three mobility patterns just noted, high status schools should have faculties with greater experience and educational attainment than low status schools. This hypothesis was also verified by the San Diego data.

Finally, teachers with many college semester hours should be less likely to terminate, particularly to leave teaching, than those with fewer hours. Teachers with many semsester hours above the bachelor's degree have made a considerable investment in human capital specific to teaching. This specific human capital should impede movement to the nonteaching sector. Similarly, young teachers, with relatively little experience and hence a relatively small investment in specific human capital, should be more likely to terminate. Since females generally have greater opportunities to engage in useful activities outside the labor force than males, and have fewer opportunities for promotions within a school system, female teachers should be more likely to terminate than male. These implications were also generally confirmed by the San Diego data.

## THE STUDY OF THE MICHIGAN EDUCATIONAL PERSONNEL SYSTEM

The focus in our San Diego study was on mobility to, from, and within the internal labor market associated with a single school district. Our concern in this report is with an internal labor market that encompasses all the school districts of the State of Michigan. The analysis includes an examination of movement into and out of this labor market and of movement between districts within the market.

The study is based on a data file that contains a stratified random sample of 15,758 Michigan teachers.[1] This file permits one to

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[1] Throughout this report, the term "Michigan teachers" refers to all certified personnel, including administrators, employed by public school districts in the State of Michigan.

Data used in this report were drawn from a much larger body of data provided by the Michigan Department of Education and assembled at Rand. Descriptions of both the particular sub-file used for this report and of the full Michigan data file--a file that is sufficiently rich to be productively used in research on numerous educational topics--are provided in Appendix C.

follow each of the sampled teachers during the four school years between 1967-68 and 1970-71, or for however long during this period the teacher was employed by a school district within the state. Each record in the file contains information on a teacher's personal characteristics; on the types of moves, if any, he made during the three year period between 1967-68 and 1970-71; on the types of assignments he held; and on the characteristics of the districts in which he taught. Among the types of moves that can be identified are entries into and exits from the Michigan teacher personnel system, transfers between Michigan districts, and promotions. Information is not provided, however, on why these moves were made. When a teacher leaves the Michigan System,[1] for example, one cannot tell whether he has left teaching or has taken a teaching job in another state. There is also no way to determine whether the separation is permanent or temporary. Similarly, one cannot distinguish between a housewife who has returned to teaching after an absence of several years and a woman who taught last year, but in another state.[2]

The Michigan data allow one to identify only the location of teachers by district and not by school. Thus, the relative non-pecuniary attractiveness of a teacher's assignment must be measured by average district characteristics. This contrasts with the San Diego study in which we estimated the non-pecuniary benefits of each school and traced the effects of these benefits on teacher movement among schools and on teacher decisions to leave the San Diego school system. The Michigan data do, however, afford the opportunity to follow teachers from one district to another, something we could not do in the San Diego study. We can also examine the influence of various district characteristics on the probability a teacher will leave the education field. Thus in contrast to San Diego, where teacher's salaries are constant across schools, the analysis of the Michigan

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[1]The terms "Michigan System" and "System" are used throughout this report to refer to the entire state educational personnel system within Michigan.

[2]Evidence we present later indicates interstate migration by teachers accounts for a relatively small proportion of flows into and from state personnel systems.

System permits consideration of the influence of pecuniary, as well as non-pecuniary, factors on teacher mobility. Moreover, the personnel system in Michigan is sufficiently large and the data cover a sufficient number of years that promotions into administrative positions can be examined, an analysis the San Diego data do not permit. The data on teachers in Michigan and in San Diego together provide a quite full picture of the factors influencing the mobility decisions of individual teachers.

Some of the more important hypotheses implied by the theory of teacher mobility and testable with the Michigan data are listed below. In general, these hypotheses are similar to those tested with the San Diego data, the major difference being that here we concentrate on the influence of school districts on mobility patterns,[1] whereas in our investigation of the San Diego school system we focused on the effects of various school characteristics.

(1) Teacher movements within the Michigan System should generate both pecuniary and non-pecuniary improvements. For example, teachers

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[1] Among the district variables used in this study are each district's geographic location, size, the wealth of residents, the characteristics of students and the type of community in which the district is located. The student characteristic measures that are used include the following: (1) the student dropout rate in 1968-69; (2) the percentage of white students in 1969-70; (3) student cognitive ability in reading, English expression, and mathematics; (4) student socioeconomic status; (5) student attitude toward school; (6) the absolute change in average student socioeconomic status between 1969-70 and 1970-71; and (7) the absolute difference in 1970-71 between 7th and 4th grade students' cognitive ability scores. The simple correlation coefficients the first four of these measures range from .67 to .86. Since each of these variables provides about as much information on the influence of student characteristics on teacher mobility behavior as any of the others, we frequently use the student cognitive ability variable to represent all four. Although the first five variables indicate the average type of student in a district at a particular point in time, the sixth variable--changes in student socioeconomic status--is used to see if teachers respond to changes in the composition of the student body. When we control for changes over time in average student socioeconomic status the seventh measure--gains in measured cognitive ability-- indicates the change in student cognitive ability, if any, as students mature. The seventh measure should provide some indication of student learning ability and teacher teaching ability.

should be observed moving from districts with low pay and low status to districts with higher pay and higher status.

(2) Teachers in districts offering low pecuniary and non-pecuniary returns should be more likely to leave the Michigan teaching sector than those who are in a high salary, high status district.

(3) Experienced teachers are more likely than less experienced teachers to be in an assignment that offers high pecuniary and non-pecuniary returns (for example, an administrative position or a teaching position at a high status school). Their investment in the human capital specific to their particular assignment is also likely to be larger than that of teachers with less experience, and they should be less likely to leave the Michigan System or to change school districts within the System.

(4) A consequence of the preceding hypotheses is that high salary, high status school districts should possess faculties with greater experience and educational attainment than the less well-endowed districts. There is, however, a tradeoff between salary and status that must be examined in conjunction with this hypothesis. Low status districts may be able to attract experienced, highly educated teachers by offering higher salaries.

(5) Interdistrict movements should depend on the size of the school districts involved. This follows from our discovery in the San Diego school system that a teacher who found his assignment unappealing frequently moved to a more attractive location *within* San Diego. In general, larger districts will provide more alternatives than smaller districts.

(6) For reasons suggested when the San Diego results were summarized, female teachers, teachers with only bachelor's degrees, and young teachers should be more likely to leave teaching than male teachers, teachers with a large number of semester hours, and middle aged teachers.

## II. MOBILITY IN A STATE EDUCATIONAL PERSONNEL SYSTEM

The Michigan educational system consists of over 600 districts, around 4,000 schools, about 90,000 teachers, and over two million students. Nearly one out of every 20 public school teachers in the United States is employed by Michigan school systems.

Table 1 shows the percentage distribution of Michigan teachers among several stayer and mover categories. As the notes to the table indicate, teachers were classified as stayers or movers on the basis of a comparison of their status in 1967-68 with their status three years later in 1970-71. Although mobility rates are usually reported as annual averages--that is, they are calculated by comparing the status of individuals across adjacent pairs of years--we compute mobility rates on a three-year basis throughout this report. This minimizes the influence on our results of any circumstances that are peculiar to a single year. Moreover, since there are certain types of moves, such as promotions and interdistrict transfers, that relatively few teachers make between adjacent school years, computing mobility rates on a three year basis enhances the analysis by substantially increasing the number of movers in these categories.

Table 1 suggests that although the Michigan Teacher Personnel System grew substantially during the three year period covered by the data, there was also substantial teacher turnover during this period; 34.6 percent of the sampled teachers entered the System during the period and 25.4 percent left.[1] The average *annual* entry and exit rates over the period were 11.5 percent and 8.5 percent. The data do not permit one to identify the major sources of new hires, but they do indicate that over half of the new hire group had previous teaching

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[1] In these calculations, temporary teachers are counted as part of both the incoming and the outgoing flows. That is, the *total* percentage of entering teachers during the three years equals new hires plus temporary teachers (27.3 + 7.3) and the total percentage of departing teachers equals terminators plus temporary teachers (18.1 + 7.3).

Table 1

DISTRIBUTION OF THE SAMPLE POPULATION AMONG MOVER AND STAYER CATEGORIES

(percent)

| | Distribution of Total Sample | Distributions of Teachers Who Were in the Michigan System 1967-68 |
|---|---|---|
| Stayers within the Michigan System[a] | 47.3 | 72.3 |
| Stayers in district | 43.0 | 65.7 |
| Movers to new district | 4.3 | 6.6 |
| Terminators[b] | 18.1 | 27.7 |
| New hires[c] | 27.3 | -- |
| Temporary teachers[d] | 7.3 | -- |
| Number of Observations | 15,758 | 11,206 |

[a]Teachers who were employed in the State of Michigan in 1967-68 and in 1970-71.

[b]Teachers who were employed in the State of Michigan in 1967-68, but not in 1970-71.

[c]Teachers who were not employed in the State of Michigan in 1967-68, but were in 1970-71.

[d]Teachers who were not employed in the State of Michigan in either 1967-68 or 1970-71, but were in either 1968-69 or 1969-70.

experience.[1] Most of these experienced teachers were probably persons who had previously taught in Michigan. The results of a mail questionnaire sent to a national sample by the National Education Association indicate that in the nation as a whole fewer than 20 percent of the teachers who leave a state personnel system migrate directly to a new teaching job in another state; the remaining 80 percent leave teaching, either permanently or temporarily.[2] In a large state system, such as the one in Michigan, the percentage of direct interstate transfers may be even lower.

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[1]Newly hired experienced teachers had taught over four years on the average, before becoming a new hire.

[2]"Teacher Mobility and Loss," *NEA Research Bulletin*, Vol. 16, No. 4, Research Division, National Education Association, December 1968.

Table 1 indicates that relatively few Michigan teachers moved among districts; only 6.6 percent of the sampled teachers who were in the Michigan System in 1967-68 were in a new Michigan district by 1970-71. However, if only those teachers who taught in Michigan during all four years are considered, 9.1 percent changed districts. The National Education Association study referred to earlier reports that the movement of teachers to another assignment location *within* the same school district is about 50 percent greater than teacher movement *between* districts within the same state. Intrastate movement between districts, however, is over twice as great as the interstate movement of teachers, presumably because of differences in the distances involved and because of state credential requirements. This suggests that state educational personnel systems tend to constitute separate internal labor markets. The survey results also indicate that *total* movement *between* districts--interstate as well as intrastate--is almost as large as movements in location within districts.[1]

Table 2 reports on flows between various types of assignments within the Michigan System. The table is applicable only to those teachers who were in the Michigan System during the entire three-year period covered by the data. The total columns and rows indicate the direction of flows between assignments over the four years. For example, 7.8 percent of the stayers in the Michigan System were administrators at the beginning of the period; but by the end of the period, 10.5 percent had become administrators. The diagonals show the percentage of stayers within the Michigan System who also remained within their assignment. For example, 7.1 percent were administrators both in 1967-68 and in 1970-71.

The table suggests that most of those who stay within the Michigan System also stay within their original assignment; only 10.5 percent changed teaching positions, and only 11.8 percent changed teaching levels or moved from a school to a central administration over the three years. However, there is considerable influx into administrative and special teaching positions: About one-third of those who were

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[1] "Teacher Mobility and Loss," NEA Research Bulletin.

Table 2

MOVES BETWEEN ASSIGNMENTS BY STAYERS WITHIN THE MICHIGAN SYSTEM[a]

A. Flows Among Teaching Positions

| Assignment in 1967-68 | Assignment in 1970-71: Administrator[b] | Special Teacher[c] | Regular Teacher | Total |
|---|---|---|---|---|
| Administrator[b] | 7.1 | 0.3 | 0.4 | 7.8 |
| Special teacher[c] | 0.2 | 5.2 | 0.8 | 6.2 |
| Regular teacher | 3.2 | 5.6 | 77.2 | 86.0 |
| Total | 10.5 | 11.1 | 78.4 | 100.0 |

B. Flows Among Teaching Levels

| Assignment in 1967-68 | Assignment in 1970-71: Elementary | Jr. High | Sr. High | Mixed Level Schools[d] | Central Administration | Total |
|---|---|---|---|---|---|---|
| Elementary schools | 45.0 | 1.4 | 0.6 | 0.6 | 0.4 | 48.0 |
| Jr. high schools | 0.9 | 15.5 | 2.0 | 0.3 | 0.2 | 18.9 |
| Sr. high schools | 0.3 | 1.1 | 22.2 | 0.8 | 0.3 | 24.7 |
| Mixed level schools[d] | 0.7 | 0.5 | 1.0 | 4.2 | 0.6 | 7.0 |
| Central administration | 0.1 | 0.02 | 0.04 | 0.04 | 1.3 | 1.5 |
| Total | 47.0 | 18.5 | 25.8 | 5.9 | 2.8 | 100.0 |

[a]Based on a comparison of the teachers' assignments in 1967-68 with their assignments in 1970-71.

[b]Administrative assignments encompass all positions from assistant principal through school superintendent.

[c]Special teacher is a heterogeneous category that includes counseling; driver and safety education; and various areas of special education such as speech correction, remedial reading, and education of the handicapped (blind, deaf, perceptually handicapped, and emotionally disturbed).

[d]Schools that offer more than one teaching level--e.g., Jr.-Sr. high schools and schools that teach 1st grade through 12th grade.

administrators and over half of those who were special teachers by 1970-71 were not in those positions in 1967-68.[1] Once teachers obtain the administrator or special teacher positions, however, they seldom return to regular teaching positions.

Table 2 also implies that teachers tend to move toward higher teaching levels. In particular, elementary and junior high schools were net losers of those who stayed in the Michigan System over the three year period; senior high schools, mixed level schools, and district central administrations were net gainers.

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[1] As noted, Table 2 pertains only to teachers who were in the Michigan System in both 1967-68 and 1970-71. During this period, a substantial number of teachers were hired from outside the System directly into administrative and special teacher positions. For example, 19.6 percent of those who assumed administrative positions in Michigan between 1967-68 and 1970-71 were new hires, and 80.4 were promoted from within the Michigan System. Almost half--47.3 percent--who became special teachers between 1967-68 and 1970-71 were hired directly into these positions from outside the System; and, as might be expected, almost all who moved into regular teaching slots--98.7 percent--came from outside.

## III. DETERMINANTS OF TEACHER MOBILITY WITHIN A STATE EDUCATIONAL PERSONNEL SYSTEM

In this section, we examine the determinants and effects of several of the more important types of teacher mobility, including terminations, moves between districts, promotions, and moves from regular teaching positions to special teaching positions. As before, a teacher is defined as having or not having made each of these moves on the basis of a comparison of his status in 1967-68 with his status in 1970-71.

We first attempt to measure the extent to which teachers' decisions to leave their current school districts, either to terminate or to move to a new district, depend on their own personal characteristics, on the salaries they receive before moving, and on the non-pecuniary character of their districts. We then examine the pecuniary and non-pecuniary returns to teachers who move between districts; that is, we investigate whether the new assignments of interdistrict transferers are measurably superior to their old assignments. Finding that non-pecuniary rates of return to interdistrict moves are positive, we test the hypothesis that districts associated with relatively low non-pecuniary returns attempt to compensate by offering higher saleries. Finally, we briefly examine the factors that influence a teacher's chances for career advancement.

### TERMINATIONS AND MOVES BETWEEN DISTRICTS

Terminations and interdistrict mobility are treated together because both represent moves away from particular school districts, the latter within the Michigan System and the former out of the System. Perspective on the importance of several of the factors that influence a teacher's decision to leave his district can be obtained from Table 3. This table is calculated from regression estimates that are briefly described in Appendix A and are reported in Table A-1. Table 3 presents estimates of the probabilities that teachers with given sets of characteristics and in particular types of assignments during a given year will have terminated or moved to a new district three years later. For example, the 15.5 percent and 5.5 percent probability estimates on the first line

Table 3

ESTIMATED PROBABILITIES OF TERMINATING OR OF MOVING TO A NEW DISTRICT FOR SELECTED CATEGORIES OF TEACHERS

| | Teacher's Characteristics | | | Teacher's Assignment | | | Probability of Terminating[a] (percent) | Probability of Moving to a New District[a] (percent) |
|---|---|---|---|---|---|---|---|---|
| | Sex, Age | Highest Degree | Location of College | Full- or Part-time | Teaching Position | Teaching Level | | |
| 1 | Male, 28-58 | B.A. | In Michigan | Full-time | Regular | Elementary | 15.5 | 5.5 |
| 2 | Male, under 28 | " | " | " | " | " | 22.1[b] | 10.2[b] |
| 3 | Male, over 58 | " | " | " | " | " | 67.1[b] | 0.0[b] |
| 4 | Female, 28-58 | " | " | " | " | " | 19.6 | 1.9[b] |
| 5 | Female, under 28 | " | " | " | " | " | 49.3[b] | 7.6[b] |
| 6 | Female, over 58 | " | " | " | " | " | 59.9[b] | 0.0[b] |
| 7 | Male, 28-58 | M.A. | " | " | " | " | 6.3[b] | 7.0[b] |
| 8 | " | Ph.D. | " | " | " | " | 7.1[b] | 12.5[b] |
| 9 | " | B.A. | Out-of-State | " | " | " | 23.3[b] | 3.6[b] |
| 10 | " | " | In Michigan | Part-time | " | " | 2.9[b] | 36.4[b] |
| 11 | " | " | " | Full-time | Administration | " | 24.4[b] | 7.0[b] |
| 12 | " | " | " | " | Special | " | 18.3[b] | 7.2[b] |
| 13 | " | " | " | " | Regular | Jr. High | 16.7 | 4.6 |
| 14 | " | " | " | " | " | Sr. High | 18.3[b] | 3.7[b] |
| 15 | " | " | " | " | " | Central Admin. | 24.9[b] | 6.8 |
| | | Mean value for total sample | | | | | 27.54 | 6.62 |
| | | Number of observations | | | | | 10,624 | 10,624 |

SOURCE: Table A-1.

[a]For purposes of calculating the probabilities reported in Table 3, all categories of teachers were assigned the mean values of each of the continuous variables used in the underlying regressions. These means, which are computed on the sample that was used in the regressions, are reported below.

| Variable | Mean | Standard Deviation |
|---|---|---|
| Salary | $8642 | $2368 |
| Lg (number of elementary schools) | 2.446 | 1.476 |
| Average cognitive ability | 50.17 | 3.359 |
| Average attitude toward school | 50.03 | 1.180 |
| Change in student characteristics | -0.192 | 2.257 |
| Improvement in student cognitive ability | -0.0610 | 1.184 |

(Since the variable for number of schools entered the regressions in natural log form, it is also reported in the tabulation above in that form. The antilogarithm of 2.446 is equal to 11.54 elementary schools.)

[b]Using a one tailed test, difference from base group (on line 1) is statistically significant at the .05 probability level.

of the table signify that of every 100 male elementary school teachers between 28 and 58 years old in regular full-time teaching positions with Bachelor's degrees from Michigan colleges, more than 15 left the Michigan System and more than five transferred to a new district within the System during a span of three years. Because the estimates in Table 3 are based upon regression equations, one can see how the probabilities of terminating and transferring differ among categories of teachers that are identical but for one or two characteristics. For example, the categories of teachers depicted on lines 2 through 6 of the table differ from the "base group" category described on line 1 with respect to age or sex, but not with respect to teaching assignments, degree level, and whether they received their most recent degree at a Michigan or an out-of-state college. Similarly, the categories of teachers listed on lines 7 through 9 differ from the base group in terms of degree level or whether they attended an in-state or out-of-state college, and those on lines 10 through 15 vary from the base group in terms of the teachers' assignments.[1]

The estimates on lines 1 through 6 of Table 3 imply that young men and young women are more likely both to terminate and to move between districts than their middle-aged counterparts. Older men and women are also more likely to terminate than middle-aged teachers of the same sex, but they are less likely to change districts. Except within the lowest category, the differences between the sexes are less pronounced than might be expected. In fact, the estimates suggest that although young women teachers are more likely to terminate than young men teachers, those women who are still teaching after the age of 28 are *not* much more likely to leave the Michigan System than men of corresponding ages.

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[1]One important comparison not made in Table 3 is that based on race. Information on the race of Michigan teachers was not collected in 1967-68, although such information was collected in 1968-69 and each year thereafter. To find out the effects of race on teacher mobility patterns, we recomputed the regressions on a sample of teachers who were employed by a Michigan school system in 1968-69 and included a variable that equaled one if the teacher was black and zero otherwise. The results indicate that black teachers with the characteristics of those in the base group are less than half as likely as white teachers with similar characteristics to terminate and about 40 percent as likely to transfer to a new school district.

Except in the preretirement years, when only a negligible number of teachers of either sex change school districts, men are substantially more likely to transfer among districts than women.

The comparison between teachers with different levels of educational attainment (lines 1, 7 and 8) suggests, as expected, that teachers with large, specialized investments in their own human capital are less likely to leave teaching than those with only a Bachelor's degree. However, these teachers, especially those with Ph.Ds, appear to have a higher than average probability of moving between school systems. Perhaps because there are relatively few teachers with Ph.Ds in the Michigan public school sector (only about one out of every one hundred), and they tend to be in highly specialized, prestigious assignments, teachers with Ph.Ds have relatively little opportunity to find superior assignments within the confines of a single school district and must go beyond the boundaries of their present school district in their job search activities. A similar explanation may account for administrators and special teachers transferring among districts more frequently than regular teachers.

Teachers who received their most recent degree from an out-of-state college leave the Mighican System with greater frequency than those who attended college within Michigan, but they are less likely to move within the System (compare lines 1 and 9). This pattern may imply that teachers with out-of-state degrees are more likely than those with in-state degrees to move across state boundaries in changing school districts.

About ten percent of the teachers in Michigan teach on a part-time schedule. The mobility patterns of these people are very different from those of full-time teachers; part-time teachers are considerably less likely to exit from the Michigan System, but have a far greater probability of moving within the System (compare line 1 and 10). These results seem to indicate that many of those teaching part-time would prefer to teach full-time. These teachers appear to remain within the Michigan System seeking out a district that, unlike their own, has an opening for a full-time teacher.[1]

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[1]Since it seems plausible that the factors influencing the mobility patterns of part-time teachers may differ substantially from those affecting full-time teachers, the regressions on which the estimates in Table 3 are based were recalculated with part-time teachers omitted. (See Table A-1.) The results are similar to those with part-time teachers included.

Table 4, which is based on the same regression equations as Table 3, indicates the amount by which various district pecuniary and non-pecuniary characteristics must change to cause a reduction of one percentage point in the probability that teachers will terminate or move to a new district. For example, if a district increased its salary level by $574 and nothing else was changed, its loss of male teachers through termination would be reduced by one percentage point. Also,

Table 4

CHANGES IN SELECTED DISTRICT CHARACTERISTICS NECESSARY TO REDUCE THE PROBABILITY OF TERMINATING OR OF MOVING TO A NEW DISTRICT BY ONE PERCENTAGE POINT

| Characteristic | Change Required to Reduce by One Percentage Point the Probability of: Terminating | Moving to a New District | Mean | Standard Deviation |
|---|---|---|---|---|
| Annual salary | | | | |
| Males | $574 | $1,404 | $9,390 | $2,878 |
| Females | $617 | NS | $8,123 | $1,880 |
| Student characteristics | | | | |
| Average cognitive ability | NS | 1.5 | 50.17 | 3.36 |
| Average attitude toward school | 0.9 | NS | 50.03 | 1.18 |
| Change in student SES[a] | 1.0 | NS | -0.19 | 2.26 |
| Improvement in student cognitive ability[b] | 1.5 | 1.7 | -0.06 | 1.18 |
| Size of district | | | | |
| Number of elementary schools | NS | 27.3[c] | 37.74 | 66.17 |
| Number of observations | 10,624 | 10,624 | | |

SOURCE: Table A-1.

NOTE: NS = not statistically significant at the .05 probability level.

[a]The change in student SES equals the value of the socioeconomic status index in 1970-1971, less that index's value in 1969-1970.

[b]Improvement in student cognitive ability is calculated by subtracting the 4th grade district average score on the cognitive ability test from the 7th grade score.

[c]Probability is evaluated at the arithmetic mean of the number of schools (i.e., 37.74).

everything else equal, a district whose students averaged 1.5 points higher on the state's battery of cognitive achievement tests than another district's students would have a rate of loss of teachers through interdistrict transfers that was one percentage point lower.

The effect of salary on the mobility of male teachers is in the expected direction; controlling for other factors, the likelihood of a male teacher leaving his current district, to move either to another district or out of teaching, is lower the higher the salary he is paid. However, Table 4 suggests that to reduce turnover rates appreciably, for male teachers, a district would have to make a substantial increase in its salary level. For example, to bring about a one percentage point decrease in the movement of teachers to other districts in Michigan would require an increase in annual salaries of $1,404. The influence of salary on the probability that women teachers would leave the Michigan System is apparently very similar to its effect on men teachers. The decision of women to move within the System, however, appears to be unresponsive to interdistrict salary differentials.

Student characteristics, a measure of the non-pecuniary returns associated with various districts, consistently appear to influence teacher mobility decisions in the expected direction; teachers in districts that are ranked low in terms of student characteristics are more likely to leave their district than are teachers in the higher ranked districts.[1] Moreover, these differences among districts in student characteristics would apparently not have to be very large to cause rather substantial differences in district turnover rates. Nevertheless, existing interdistrict variation in student characteristics is probably too small to cause great differences in teacher turnover rates among districts employing most of the teachers in Michigan. Most Michigan teachers, as the rather small standard deviations for the student characteristic variables reported in Table 4 imply, are employed by districts

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[1] Teachers who are in districts ranked low on one of the four student characteristic measures used in Table 4 are not necessarily in districts that ranked low on the other measures. The coefficients for the simple correlations among the four measures are all below 0.2 in absolute value, and four of the six coefficients are negative. Thus, the four variables appear to provide rather independent measures of the non-pecuniary returns associated with various districts.

that vary relatively little in the average characteristics of their students.

From a district's perspective, it is unfortunate that teacher mobility decisions are influenced by student characteristics, about which the district can do little, but are rather insensitive to salary levels, over which it does have some control. In other (unreported) results we found that certain additional factors over which districts can exercise some control (such as adoption of innovative services and facilities, the amount of support staff provided teachers, and non-salary expenditures per pupil) are also apparently not systematically related to teacher turnover. These results suggest that districts that are dissatisfied with their turnover rates can do little to alter the factors that influence whether a given teacher stays or leaves.

One of the most striking contrasts between teacher mobility patterns in Michigan and those we found in San Diego is that the rate of *interschool* moves within San Diego is around three times the rate of *interdistrict* moves in Michigan. This implies that the characteristics of a particular school a teacher is assigned to has substantially greater bearing on his decision to change the location of his assignment than does the overall character of the school district that employs him. As already suggested, the variance in average student characteristics among districts is rather small. The variation among schools within a large district, such as San Diego's, can be substantial, and our results for San Diego indicate that teachers are very responsive to these differences. It also appears likely that because of seniority arrangements, geographic distances, and so forth, intradistrict moves would be easier for teachers to make than interdistrict moves. The finding in Table 4 that teachers are more likely to change school systems when their original district is relatively small implies that interdistrict movement often occurs when teachers look elsewhere after being unable to locate a satisfactory assignment within their old district.

We also found in San Diego that although *school* characteristics strongly influence interschool mobility decisions, they have little systematic effect on termination decisions. This finding, coupled with the rather small differences among districts in student characteristics,

suggests that teachers seldom quit teaching as a result of dissatisfaction with a particular school or district but rather look for a preferable assignment elsewhere, most often within their current district.

## THE RETURNS TO INTERDISTRICT TRANSFERS

Once a teacher has decided to move from one school system to another, it seems reasonable for him to attempt to select a new district that offers greater pecuniary and non-pecuniary returns than his old district. That this is indeed the case so far as non-pecuniary returns are concerned is indicated by Table 5,[1] which compares the characteristics of the initial and new school systems of teachers who moved between districts.[2] The difference between the characteristics of students found in the new district and those enrolled in the old generally appears to be consistent with the expected preferences of most teachers.[3]

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[1] Several district characteristics listed in Table 5 were not included in the regressions reported in Table A-1. One reason was that experiments with several of the district characteristic variables--for example, region, district wealth, and class size--indicated that they apparently have no independent effect on the probability that a teacher will move away from his current district; however, as Table 5 suggests, once a teacher has decided to move, these variables may influence his choice of a new district. Several of the other variables left out of the regressions are highly collinear with variables that were included. For example, as pointed out earlier, student dropout rates, the percentage of white students, and average student socioeconomic status are all highly correlated with average student cognitive ability. Once district size is controlled for, the type of community (city, town, rural, or suburb) in which the district is located does not appear to have an independent effect on the probability of transferring between districts or terminating.

[2] A separate comparison of old and new districts that is computed for only full-time teachers who transferred between districts (part-time teachers are excluded) is reported in Table A-3. In general, the change in district characteristics from old district to new is in the same direction as that shown in Table 5.

[3] Table 5 indicates that teachers tend to move toward districts with a higher percentage of white students. Black teachers may, of course, prefer to move to districts that have a higher percentage of black students. However, fewer than five percent of the teachers who engaged in interdistrict transfers between 1967-68 and 1970-71 were black.

The differences in student characteristics of the teacher's old and new *schools* may, of course, be considerably greater than differences in district averages, except in cases where districts consist of a single school.

Table 5

A COMPARISON OF THE OLD AND NEW DISTRICTS OF TEACHERS WHO TRANSFERRED BETWEEN DISTRICTS

(mean values of selected school characteristics)

| District Characteristics | Regular Teachers[a] | | Special Teachers[a] | | Administrators[a] | |
|---|---|---|---|---|---|---|
| | Old District | New District | Old District | New District | Old District | New District |
| Student characteristics | | | | | | |
| Average cognitive ability | 50.1 | 51.1 | 50.2 | 51.4 | 49.8 | 51.1 |
| Average attitude toward school | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| Average student socioeconomic status | 49.9 | 50.6 | 50.0 | 50.8 | 49.7 | 50.4 |
| Student dropout rate | 6.8 | 5.8 | 6.9 | 5.5 | 6.6 | 5.2 |
| Percentage of white students in district | 86.7 | 92.1 | 89.7 | 91.9 | 88.1 | 93.4 |
| Percentage of black students in district | 13.3 | 7.9 | 10.3 | 8.1 | 11.9 | 6.6 |
| Change in student SES | .18 | -.16 | .20 | -.54 | .58 | .18 |
| Improvement in student cognitive ability | -.06 | -.03 | .10 | .07 | -.06 | -.13 |
| Size of district | | | | | | |
| Number of elementary schools | 24 | 16 | 15 | 16 | 22 | 7 |
| Number of teachers | 1161 | 698 | 636 | 711 | 1041 | 248 |
| Number of students | 29486 | 17331 | 15209 | 17116 | 26652 | 5872 |
| Region[b] | | | | | | |
| Detroit area | 42.5 | 35.2 | 44.2 | 37.5 | 33.3 | 21.6 |
| Southern lower peninsula | 49.5 | 52.3 | 46.2 | 52.9 | 53.9 | 63.7 |
| Northern lower peninsula | 5.8 | 9.2 | 6.7 | 5.8 | 11.8 | 12.7 |
| Upper peninsula | 2.1 | 3.3 | 2.9 | 3.8 | 1.0 | 2.0 |
| Community type[b] | | | | | | |
| Large city | 18.0 | 14.0 | 14.4 | 16.3 | 14.7 | 5.9 |
| Small city | 4.9 | 8.6 | 11.5 | 12.5 | 5.9 | 9.8 |
| Urban fringe | 39.7 | 37.0 | 35.6 | 37.5 | 30.4 | 31.4 |
| Town | 14.5 | 15.2 | 17.3 | 18.3 | 16.7 | 22.5 |
| Rural area | 22.9 | 25.1 | 21.2 | 15.4 | 32.4 | 30.4 |
| District growth (% change in enrollment) | 2.3 | 3.2 | 2.0 | 2.6 | 2.4 | 2.9 |
| District wealth (state equalized value per resident pupil) | 15770 | 16435 | 15201 | 16965 | 15205 | 15373 |
| Class size (students per teacher) | 25.6 | 25.0 | 25.6 | 24.5 | 25.5 | 24.9 |
| Number of observations[c] | 1169 | | 104 | | 102 | |

[a]Teachers are categorized according to the teaching position they held at their old district in 1967-68.

[b]Reported as the percentage of teachers in each type of district.

[c]Because of missing information, the number of observations used to compute the mean values for student dropout rates, student attitudes, and student SES may be slightly smaller than the number reported here.

Moreover, Table 5 indicates that transferring teachers tend to move to districts that are wealthier and have smaller classes than their initial district.

Table 5 also implies that, with the exception of those in special teacher positions, transferring teachers are inclined to move away from districts that are located in large cities, particularly within the Detroit area; and their new districts therefore tend to be smaller than their old.[1] Perhaps somewhat counter to what one might expect, however, these teachers do not seem to move into suburban school systems. They tend rather to relocate in smaller cities and towns, especially those located in the Southern Lower Peninsula. It is also somewhat surprising that there is no tendency--at least for persons in regular teaching positions--to migrate away from rural areas or from the economically depressed Michigan Upper Peninsula.

A somewhat different perspective on geographic moves within the State of Michigan is provided by Table 6, which indicates that although the Detroit area has lost teachers to other parts of the state, this loss was trivial--only one-half of one percent of all teachers who stayed within the Michigan System between 1967-68 and 1970-71. The upper numbers along the diagonal in Table 6 show that the vast majority of teachers did not change districts over the three year period, and the lower numbers along the diagonal imply that most of those who did transfer between districts remained within their original region.

Taken together, Tables 5 and 6 suggest that although teachers who move between districts do tend on average to flow toward districts that offer higher non-pecuniary returns than their old districts, the size of the flow is too small to have a significant influence on the allocation

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[1] In interpreting the results in Tables 4 and 5, note the different consequences of relations between a district variable and the probability of terminating, and the same variable and the probability of transferring. If teachers have a high probability of terminating from a particular type of district, districts of that sort are net losers of teachers and must either hire new teachers or reduce their staff. If teachers have a high probability of transferring from districts with particular characteristics, however, it is possible that they may move to another district with similar characteristics (for example from one small district to another).

Table 6

MOVES AMONG REGIONS BY STAYERS WITHIN THE MICHIGAN SYSTEM

(In percent)

| Region in 1967-68 | Region in 1970-71 | | | | |
|---|---|---|---|---|---|
| | Detroit Area | S. Lower Peninsula | N. Lower Peninsula | Upper Peninsula | Total |
| Detroit Area | 40.4 / 2.2[a] | 1.0 | 0.2 | 0.2 | 44.0 |
| Southern Lower Peninsula | 0.7 | 41.3 / 3.7[a] | 0.5 | 0.1 | 46.0 |
| Northern Lower Peninsula | 0.1 | 0.3 | 4.7 / 0.2[a] | 0.1 | 5.4 |
| Upper Peninsula | 0.1 | 0.1 | 0.1 | 3.8 / 0.2[a] | 4.3 |
| Total | 43.5 | 46.4 | 5.7 | 4.4 | 100.0 |

Note: Table is based on a comparison of teachers' regions in 1967-68 with their regions in 1970-71.

[a]Percentage of teachers who changed districts but stayed within the same geographic region are below the line, and percentage who did not change districts are above the line.

of teachers among different types of districts. The absence of allocative effects of interdistrict transfers was also implied by a number of additional (unreported) statistical comparisons that we performed. This result is quite different from those for San Diego, where we found that as a consequence of interschool mobility within a single district, schools that offered teachers high non-pecuniary returns had faculties with greater experience and educational attainment than lower ranked schools.[1]

Table 7 reports the actual salaries that transferring teachers received from their new district in 1970-71 and predicts the salaries they

[1]For example, the simple correlation coefficient for the relation between the median I.Q. of students in San Diego elementary schools and the years of experience of their teachers is .16; the correlation coefficient for the relation between average student cognitive ability in Michigan districts and the years of experience of teachers within those districts is -.05.

Table 7

A COMPARISON OF ACTUAL AND PREDICTED SALARIES, PROMOTIONS AND MOVES TO SPECIAL TEACHER POSITIONS FOR TEACHERS WHO TRANSFERRED BETWEEN DISTRICTS

(number of observations in parentheses)

| Teaching Position Held at Old District in 1967-68 | Salary in 1970-71 | | % Promoted by 1970-71 | | % Becoming Special Teacher by 1970-71 | |
|---|---|---|---|---|---|---|
| | Actual | Predicted[a] | Actual | Predicted[b] | Actual | Predicted[b] |
| Regular teachers | $10,625 | $10,550 | 5.6 | 2.3 | 10.9 | 9.2 |
| | (1032) | | (1050) | | (1050) | |
| Special teachers | $11,109 | $10,981 | 5.2 | 1.3 | -- | -- |
| | (96) | | (97) | | | |
| Administrators | $16,678 | $17,022 | -- | -- | -- | -- |
| | (96) | | | | | |

[a]Salary is predicted with the regression reported in the first column of Table B-1. We made the prediction assuming that had the teacher not transferred districts his assignment and district characteristics would have remained what they were in 1967-68. The values used for experience, age, degree level, and whether the teacher had a permanent certificate pertain to 1970-71.

[b]Promotions and moves to special teacher positions are predicted with the regressions reported in the first and third columns of Table A-2. In making the predictions we assumed that had the teacher not transferred districts his teaching level and district characteristics would have remained what they were in 1967-68. The values used for experience, degree level, and whether the teacher had a permanent certificate pertain to 1970-71.

*would* have received in that year had they stayed in their original district. The table also compares the actual percentage of transferring teachers who were promoted or who became special teachers between 1967-68 and 1970-71 with predictions of the percentage who would have moved into these positions had they remained at their original district. The predictions are all based on estimated regression equations that will be described later.

Table 7 indicates that a substantial percentage of the regular and special teachers who changed school districts were promoted into administrative positions. For purposes of making the salary predictions, we assumed that none of these persons would have been promoted had they not changed districts. Thus, the difference between the actual and predicted

1970-71 salaries of those in regular or special teaching positions in 1967-68 is, if anything, overstated. Nevertheless, these differences tend to be rather small--$75 for regular teachers and $128 for special teachers, a rate of return to moving of around 1 percent. Moreover, the actual salary that transferring administrators received in 1970-71 is smaller than the estimate of the salary that they would have received had they not changed districts. The salary figures reported in Table 7, however, have not been adjusted for geographic differences in the cost of living. Transferring teachers, it will be recalled, tend to move away from the Detroit area and toward smaller cities and towns. The general flow of these teachers, therefore, is toward areas that are less expensive to live in. Thus, the real pecuniary return to a change in districts may be somewhat greater than is indicated by Table 7, but nevertheless are probably relatively modest.[1]

One of the most important returns to interdistrict transfers seems to be in the form of promotions. Table 7 implies that many of the transferring teachers would not have received promotions had they been unwilling to move. Moreover, the ultimate effect of transferring on promotion may be understated in Table 7. We can examine promotions only up to 1970-71; it seems likely that the gap between the number of promotions transferring teachers actually received and those they would have received if they remained in their original district will widen over time.

## TRADEOFFS BETWEEN SALARIES AND DISTRICT CHARACTERISTICS

In 1776, Adam Smith predicted that

> The whole of the [pecuniary and non-pecuniary] advantages and disadvantages of the different employments of labor and stocks must...be either perfectly equal or continually

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[1] The Department of Labor estimates that the cost of living for a moderate income family in the North Central part of the United States (the part that includes Michigan) is about 7 percent higher in metropolitan areas than nonmetropolitan areas (U.S. Department of Labor, *Three Standards of Living*, Spring 1967). Table 5 indicates that on net less than 10 percent of interdistrict transferrers moved from metropolitan to nonmetropolitan districts. Failure to take cost-of-living differentials into account, therefore, probably resulted in understating the pecuniary rate of return to transferring reported by less than 1 percent (i.e., 7 percent times 10 percent).

> tending to equality...[For if] there was any employment evidently more or less advantageous than the rest, so many people would crowd into it in the one case, and so many would desert it in the other, that its advantages would soon return to the level of the other employment.[1]

The evidence we have presented seems consistent with the sort of mobility patterns Smith expected: Teachers within the Michigan System do move toward the more advantageous school districts and away from the less advantageous. In particular, teachers tend to move away from districts that are ranked low on the basis of various student attributes, that are relatively large, and that are located in large cities and in the Detroit area. However, it is unclear whether the amount of movement that takes place among different types of districts, which is rather small, is sufficient that the pecuniary and non-pecuniary differences between districts are, as Smith predicts, "continually tending to equality." For this to occur, districts must compensate for non-pecuniary disadvantages by offering higher salaries than districts with more attractive non-pecuniary characteristics, thereby tending in Smith's phrase, to bring "the *whole* of the advantages and disadvantages" of different districts into equality.

To test for this possibility, we computed a regression estimate of the effects of various district characteristics on the annual salaries received by teachers who were in the Michigan system in 1970-71.[2] The results from this regression, which are reported in Table 8, suggest that there is indeed a tradeoff between district salary levels and several of the non-pecuniary district characteristics. For example, districts that are *not* located in the Detroit area or in large cities apparently pay relatively low salaries.[3] Also consistent with the tradeoff hypothesis

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[1] Adam Smith, *The Wealth of Nations*, J. M. Dent & Sons Ltd., London, 1960, p. 88.

[2] Various teacher personnel and assignment variables were also included in the regression as controls. The effect of these factors on teachers' salaries are discussed in Appendix B. The full regression equation is reported in Table B-1.

[3] One reason salaries are higher in the Detroit area and in large cities is probably that the cost of living is higher in these places. This of course, is consistent with the trade-off hypotheses, for high prices may be one reason teachers tend to move away from these places.

Table 8

ESTIMATED REGRESSION COEFFICIENTS FOR THE RELATION BETWEEN ANNUAL SALARY AND DISTRICT CHARACTERISTICS[a]

| District Characteristics | Coefficient | t-ratio |
|---|---|---|
| Student characteristics | | |
| Average cognitive ability | 27.19 | 4.33 |
| Average attitude toward school | -23.57 | -2.10 |
| Change in student SES[b] | -37.21 | -5.11 |
| Size of district | | |
| lg(number of elementary schools) | 96.37 | 4.99 |
| District wealth | | |
| State equalized value per resident pupil | 0.00941 | 4.31 |
| Region | | |
| Southern Lower Peninsula = 1 | -874.52 | -23.04 |
| Northern Lower Peninsula = 1 | -1324.2 | -18.58 |
| Upper Peninsula = 1 | -1322.2 | -15.33 |
| Community type | | |
| Small city = 1 | -399.34 | -5.97 |
| Urban fringe = 1 | -178.96 | -2.81 |
| Town = 1 | -433.94 | -5.90 |
| Rural = 1 | -613.00 | -7.80 |
| | 8424.0 | |

[a]The regression from which the coefficients reported here are extracted is presented in Table B-1. The regression includes additional variables that are intended to control for differences in teachers' personal characteristics and in their assignments.

[b]The absolute change between 1969-70 and 1970-71 in the socio-economic status index for the teacher's district.

is the positive relation between salaries and district size and the negative relations between salaries and student attitudes toward school and changes in student SES. The two district variables that do not appear to have the expected relationship with salary are district wealth and average student cognitive ability. Our initial hypothesis for the relation between salary and wealth was that teachers would accept low salaries in order to teach the children of well-off parents rather than the children of poor parents. However, an alternative hypothesis, one that is consistent with the observed positive relation between salary and wealth, is that wealthy districts use their capacity to pay high salaries to attract more capable teachers. If more capable teachers

do actually receive higher salaries, this could also explain the positive relation between salary and student cognitive ability.

MOVES TO ADMINISTRATIVE AND SPECIAL TEACHING POSITIONS

In this subsection, we briefly examine another dimension of teacher mobility: the movements of persons in regular and special teaching assignments into administrative positions, and of persons in regular teaching assignments into special teaching positions. Whereas becoming an administrator is usually considered a promotion, a move into a special teaching position also seems to represent a career advancement. Many more teachers move into special teacher positions than away from them. In fact, the flow of regular teachers into special teaching positions between 1967-68 and 1970-71 was seven times as large as the flow of teacher personnel in the opposite direction,[1] while promotions to administrator were only five times as large as movements in the opposite direction.

Table 9, which is analogous to Table 3, presents estimates of the probabilities of being promoted or becoming a special teacher for teachers in various categories. The probabilities are conditional in the sense that they are applicable only to teachers who have decided to remain within the Michigan System between 1967-68 and 1970-71. The regression equations on which Table 9 is based are reported in Table A-2.

Table 9 indicates that two of the most important influences on movements into administrative and special teaching positions are sex and educational attainment. A higher degree appears to considerably enhance a teacher's probability of making either type of move (compare lines 1, 3, and 4). The role of sex is somewhat different. Women, apparently, are less likely to become administrators than men, but they are more likely to become special teachers (compare lines 1 and 2), suggesting that many capable women find career paths to administrative positions blocked off and consequently travel the more open avenues to special teaching assignments.

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[1]The special teacher category is a somewhat diverse one including counselors, special education teachers, and driver and safety education teachers. It seems likely that teachers do not consider transfers into all of these positions (e.g., driver education) an advancement.

Table 9

ESTIMATED PROBABILITIES OF BEING PROMOTED OR OF BECOMING A SPECIAL TEACHER FOR SELECTED CATEGORIES OF TEACHERS IN THE MICHIGAN SYSTEM BETWEEN 1967-68 AND 1970-71

| | Characteristics | | | | Assignment | | | | Conditional Probability of Being Promoted to Administrator (percent) | Conditional Probability of Becoming a Special Teacher (percent) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Sex | Highest Degree | Teaching Experience | Type of Teaching Certificate | Teaching Position | Teaching Level | Inter-district Transferer[b] | Number of Teachers in District | | |
| 1 | Male | M.A. | 15 years | Permanent | Regular | Sr. High | No | 3,000 | 10.0 | 10.5 |
| 2 | Female | " | " | " | " | " | " | " | 4.4[a] | 14.1[a] |
| 3 | Male | B.A. | " | " | " | " | " | " | 5.9[a] | 3.5[a] |
| 4 | " | Ph.D. | " | " | " | " | " | " | 21.7[a] | 13.7[a] |
| 5 | " | M.A. | 5 years | " | " | " | " | " | 7.9[a] | 9.6 |
| 6 | " | " | 25 years | " | " | " | " | " | 10.6[a] | 10.3 |
| 7 | " | " | 15 years | Temporary | " | " | " | " | 9.4 | 10.0 |
| 8 | " | " | " | Permanent | Special | " | " | " | 9.0 | -- |
| 9 | " | " | " | " | Regular | Elementary | " | " | 10.6 | 5.8[a] |
| 10 | " | " | " | " | " | Sr. High | " | " | 11.1[a] | 11.8[a] |
| 11 | " | " | " | " | " | Central Admin. | " | " | 18.7[a] | 0.5[a] |
| 12 | " | " | " | " | " | Sr. High | Yes | " | 13.9[a] | 16.6[a] |
| 13 | " | " | " | " | " | " | No | 10,000 | 13.4[a] | 14.9[a] |
| | Mean Value for Total Sample | | | | | | | | 3.37 | 6.36 |
| | Number of Observations | | | | | | | | 7224 | 6755 |

SOURCE: Table A-2.

[a]Using a one tailed test, difference from base group (on line 1) is statistically significant at the .05 probability level.

[b]Indicates whether the teachers in a category changed districts between 1967-68 and 1970-71.

In his earlier years, a teacher's probability of career advancement increases as he gains experience (compare lines 1 and 5). However, the contribution of experience declines with each passing year (compare the difference between lines 5 and 1 with that between lines 1 and 6) and even in the earlier part of a teacher's career (say, between his fifth and 15th year) is not particularly strong. It also does not seem to matter very much whether a teacher has a temporary or permanent certificate (compare lines 1 and 7).

The assignment a teacher holds does not generally seem to have much effect on his chances of promotion, although, as might be expected, teachers in the administrative headquarters of school systems are particularly likely to be promoted. Teachers' assignments seem to have greater bearing on whether they become special teachers. Elementary school teachers and persons at central administrations are apparently considerably less likely to obtain such positions than are junior and senior high school teachers.

Our analysis of interdistrict transfers implied that such moves increase the likelihood of being promoted or of becoming a special teacher. This conclusion is reinforced by the results in Table 9 (compare lines 1 and 1[illegible]

The results in Table 9 also indicate that teachers in large districts have a greater probability of becoming an administrator or special teacher than do teachers in small districts. This is because larger districts tend to allocate a higher proportion of their total slots to these positions. However, even when districts with extreme differences in size are compared (lines 1 and 13), the magnitude of the district size effect does not appear to be very large. Perhaps this is because teachers are able to move from one district to another when openings occur in positions in which they are interested.

## IV. CONCLUSIONS

This report has applied a human capital/internal labor market theory of teacher mobility to school districts in the State of Michigan. Previously, this theoretical framework was used to explain teacher mobility within a single school district, the San Diego school system.[1] As with the San Diego study, our empirical results are consistent with those predicted by the economic framework.[2] For example, the results indicated that teachers with greater investments in human capital (teaching experience and educational attainment) are much less likely to terminate than teachers with smaller investments and that the upward mobility of teachers within the hierarchy of the Michigan System bears a strong positive relationship to their educational attainment. Teacher movements, as predicted, tend to generate both pecuniary and non-pecuniary improvements. Teachers move from regular teaching positions to administration and special teaching positions; they transfer to higher teaching levels (from elementary and junior high schools to high schools); they move to districts where salaries are slightly higher and where they are considerably more likely to receive a promotion; and they move to districts where students possess more attractive qualities. Moreover, terminations are more likely to occur in both low salary districts and districts with relatively unattractive student characteristics. There is also some evidence, although in this case somewhat mixed, that districts with unattractive non-pecuniary features tend to compensate by paying higher salaries.

District student characteristics appear to be much more important in teacher decisions to terminate or to change districts than are salary

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[1] See Greenberg and McCall, January 1973.

[2] Teacher mobility, student performance and other teacher characteristics are all highly interrelated phenomena. The simple regression analysis conducted for this report and for the earlier San Diego study ignored these interrelations. In the future, we hope to develop a simultaneous equations model of teacher mobility in which the interplay among these variables can be discerned. Such a model can be used to explore more fully the implications of observed teacher mobility patterns for educational effectiveness.

considerations. District attempts to modify turnover rates through salary adjustments would probably, therefore, meet only limited success. Nevertheless, the mobility patterns described in this report are probably not such as to cause problems for most districts, since there is little evidence that these patterns have much effect on how teachers are allocated among different types of school districts. This contrasts with our finding from the San Diego study on how teachers are allocated among *schools*. In that study, we found a strong tendency for schools whose students have characteristics teachers find attractive to have faculties with relatively greater experience and education. Among the reasons this outcome was not observed for districts, at least those in Michigan, is that movement among districts is smaller than movement among schools within a single large district. This is partly because differences in average student characteristics for districts employing most teachers is relatively small. Those among schools within a large district are often quite substantial. Furthermore, barriers to movement among schools within a district are probably more porous than those among districts. Teachers desiring a change in assignment seem to look first within their own district and then to other districts. Interdistrict movement appears most likely to occur where opportunities for intradistrict movement are limited, such as for teachers with Ph.Ds or teachers in small districts.

## Appendix A

## SUPPLEMENTAL STATISTICAL RESULTS

The regressions on terminations and moves to new districts (Table A-1) are computed on those teachers in the sample who were employed by the Michigan School System in 1967-68. The regressions were computed both with part-time teachers included and with part-time teachers excluded. The results reported in Tables 4 and 5 are based on the larger sample. The dependent variables used in the regressions equal one if the teacher made the indicated move between 1967-68 and 1970-71, and zero if he did not.[1] To facilitate comparison, the same explanatory variables are used in both the termination and the interdistrict mover regressions. Except for the part-time, educational attainment, and out-of-state degree variables, the explanatory variables all pertain to a teacher's status in 1967-68.[2]

In estimating the regression equations, we treated sex and age in combination because the relative attachment of men and women to the labor force may vary over the life cycle. Young women teachers, for example, may terminate because of various home responsibilities, such as child rearing. Young males do not usually leave the labor force, but do

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[1] Since these dependent variables are dichotomous, the ordinary least squares regression estimation technique we use may not be entirely appropriate. However, because the time and resources available for this study were rather limited, tests of the sensitivity of the results of alternative techniques, such as logit and probit transformations, were not possible.

[2] The part-time variable indicated whether a teacher taught part-time during any year between 1966 and 1970; the educational attainment and out-of-state degree variables refer to the level and location of a teacher's most recent degree. Since teachers who left the Michigan System between 1967-68 and 1970-71, unlike those who stayed, did not have the entire span of four years in which to work part-time or to earn a Master's Degree or Ph.D. from a Michigan college, the estimated effect of these variables on the probability of terminating may be biased. Moreover, since the termination and interdistrict transfer variables are inversely correlated (the simple correlation coefficient is -0.16) the estimated relations between the transfer variable and the part-time, educational attainment, and out-of-state degree variables may also be subject to a small bias.

Table A-1

REGRESSIONS ON TERMINATION AND MOVE TO NEW DISTRICT[a]

| | Dependent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Termination = 1 Part-Timers | | | | Move to New District = 1 Part-Timers | | | |
| | Included | | Excluded | | Included | | Excluded | |
| Independent Variables | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio |
| Personal characteristics | | | | | | | | |
| Sex, age | | | | | | | | |
| Male, under 28 = 1 | 6.62 | 3.67 | 5.91 | 3.09 | 4.75 | 4.63 | 5.70 | 6.10 |
| Male, over 58 = 1 | 51.6 | 15.60 | 51.0 | 15.09 | -5.47 | -2.90 | -3.66 | -2.21 |
| Females, 28-58 = 1 | 2.87 | 0.68 | 2.43 | 0.54 | -10.05 | -4.15 | -5.28 | -2.43 |
| Female, under 28 = 1 | 32.6 | 8.32 | 33.5 | 8.17 | -4.34 | -1.94 | -0.120 | 0.06 |
| Female, over 58 = 1 | 42.2 | 9.24 | 42.3 | 8.87 | -12.86 | -4.95 | -7.65 | -3.28 |
| Educational attainment | | | | | | | | |
| Master's = 1 | -9.25 | -9.53 | -8.76 | -8.60 | 1.57 | 2.84 | 1.56 | 3.14 |
| Ph.D. = 1 | -8.41 | -2.31 | -7.64 | -2.01 | 7.01 | 3.38 | 6.30 | 3.39 |
| Out-of-state degree = 1 | 7.76 | 7.91 | 7.90 | 7.68 | -1.87 | -3.35 | -1.63 | -3.25 |
| Part-timer = 1 | -12.6 | -8.12 | -- | -- | 30.90 | 35.06 | -- | -- |
| Pecuniary returns | | | | | | | | |
| Salary | -0.00175 | -4.97 | -0.00187 | -5.12 | -0.000712 | -3.55 | -0.000685 | 3.84 |
| Female salary (Male salary = 0) | 0.000133 | 0.30 | 0.000188 | 0.41 | 0.000754 | 3.03 | 0.000367 | 1.64 |
| Assignment | | | | | | | | |
| Teaching position | | | | | | | | |
| Administrator = 1 | 8.86 | 4.25 | 9.51 | 4.40 | 3.10 | 2.61 | 2.70 | 2.56 |
| Special teacher = 1 | 2.85 | 1.65 | 2.54 | 1.38 | 1.74 | 1.77 | 1.12 | 1.24 |
| Teaching level | | | | | | | | |
| Junior high school = 1 | 1.18 | 1.02 | 1.44 | 1.18 | -0.890 | -1.36 | -1.03 | -1.73 |
| Senior high school = 1 | 2.78 | 2.58 | 2.71 | 2.40 | -1.80 | -2.94 | -1.62 | -2.95 |
| Mixed level school = 1 | 7.01 | 4.17 | 7.20 | 4.07 | 0.111 | 0.12 | -0.219 | -0.25 |
| Central administration = 1 | 9.39 | 2.66 | 9.06 | 2.48 | 1.36 | 0.68 | 2.58 | 1.45 |
| District characteristics | | | | | | | | |
| Student characteristics | | | | | | | | |
| Average cognitive ability | -0.0191 | -0.12 | -0.0408 | -0.24 | -0.686 | -7.58 | -0.595 | -7.25 |
| Average attitude toward school | -1.11 | -3.26 | -1.13 | -3.16 | -0.101 | -0.52 | 0.0492 | 0.28 |
| Change in student SES[b] | -0.957 | -4.43 | -0.981 | -4.28 | -0.0394 | -0.32 | -0.235 | -2.10 |
| Improvement in student cognitive ability[c] | -0.685 | -1.99 | -0.683 | -1.88 | -0.587 | -2.99 | -0.216 | -1.22 |
| Size of district | | | | | | | | |
| lg(number of elementary schools) | -0.278 | -0.69 | -0.298 | -0.71 | -1.84 | -8.10 | -1.96 | -9.53 |
| Intercept term | 87.7 | | 90.3 | | 55.5 | | 42.5 | |
| $R^2$ | 0.184 | | 0.188 | | 0.146 | | 0.04 | |
| Percentage of sample making move | 27.54 | | 28.01 | | 6.62 | | 4.24 | |
| Number of observations | 10624 | | 9678 | | 10624 | | 9678 | |

[a] The coefficients have been multiplied by 100.

[b] The absolute change between 1969-70 and 1970-71 in the socioeconomic status index for teacher's district.

[c] The absolute difference between 4th and 7th grade average ability test scores in the teacher's district.

terminate to take a job elsewhere. Later in life, the factors influencing the termination decisions of men and women may be more similar. An interaction term between sex and salary was also included in the regressions. Because of her husband's job, a woman teacher may be less geographically mobile than her male counterpart. If so, men should be more responsive than women to interdistrict wage differentials. The number of elementary schools in a district was entered into the regressions in natural log form, reflecting our expectation that a teacher's opportunity to move within the internal labor market represented by a district will be more affected by whether there are, say, two or four schools in the district than by whether there are 100 or 200 schools.

Table A-2 reports regressions on promotion and moves to special teaching positions. The dependent variables used in these regressions equal one if the teacher made the relevant move between 1967-68 and 1970-71, and zero if he did not. The promotion regressions are computed on persons who held regular or special teaching positions in Michigan in 1967-68, while the move to special teacher regressions are computed on individuals who were regular teachers in that year. The observations used in computing these regressions were further restricted to teachers who were still in the Michigan System in 1970-71. Thus the probability estimates presented in Table 9 are conditional on teachers having decided to remain within the Michigan System for a period of at least three years.

Table A-2

REGRESSIONS ON PROMOTION AND MOVE TO SPECIAL TEACHING POSITION[a]

| Independent Variables | Dependent Variables | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Promotion = 1 | | | | Move to Special Teaching Position = 1 | | | |
| | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio |
| Personal characteristics | | | | | | | | |
| Female = 1 | -5.47 | -11.31 | -5.65 | -11.67 | 3.63 | 5.15 | 3.64 | 5.18 |
| Years of experience | 0.303 | 3.54 | 0.356 | 4.14 | 0.0654 | 0.54 | 0.197 | 1.59 |
| Years of experience squared | -0.00645 | -3.00 | -0.00732 | -3.40 | -0.00286 | -0.94 | -0.00541 | -1.76 |
| Educational attainment | | | | | | | | |
| Master's = 1 | 4.20 | 8.87 | 4.13 | 8.75 | 7.04 | 11.03 | 6.98 | 10.96 |
| Ph.D. = 1 | 15.86 | 7.13 | 15.55 | 7.03 | 10.62 | 3.12 | 10.17 | 3.00 |
| Permanent teaching certificate = 1 | 0.568 | 0.88 | 0.615 | 0.96 | 0.271 | 0.31 | 0.536 | 0.61 |
| Assignment | | | | | | | | |
| Teaching position | | | | | | | | |
| Special teacher = 1 | -0.964 | -1.23 | -1.04 | -1.33 | -- | -- | -- | -- |
| Teaching level | | | | | | | | |
| Junior high school = 1 | -0.579 | -0.96 | 0.445 | 0.74 | 5.91 | 6.99 | 5.96 | 7.06 |
| Senior high school = 1 | -0.550 | -0.98 | -0.628 | -1.12 | 4.56 | 5.79 | 4.67 | 5.94 |
| Mixed level school = 1 | -0.291 | -0.30 | -0.528 | -0.55 | 20.76 | 14.22 | 20.49 | 14.07 |
| Central administration = 1 | 8.26 | 2.88 | 8.08 | 2.82 | -4.86 | -1.05 | -5.29 | -1.15 |
| Interdistrict transferrer = 1 | -- | -- | 3.90 | 5.17 | -- | -- | 6.14 | 5.82 |
| Size of district | | | | | | | | |
| Number of teachers | 0.000473 | 7.55 | 0.000483 | 7.72 | 0.000632 | 7.73 | 0.000649 | 7.96 |
| Intercept term | 1.37 | | 0.73 | | -3.50 | | -5.38 | |
| $R^2$ | 0.065 | | 0.069 | | 0.068 | | 0.073 | |
| Percentage of sample making move | 3.37 | | 3.37 | | 6.36 | | 6.36 | |
| Number of observations | 7224 | | 7224 | | 6775 | | 6775 | |

[a]The regression coefficients have been multiplied by 100.

Table A-3

A COMPARISON OF THE OLD AND NEW DISTRICTS OF FULL-TIME TEACHERS WHO TRANSFERRED BETWEEN DISTRICTS

| District Characteristics | Regular Teachers[a] | | Special Teachers[a] | | Administrators[a] | |
|---|---|---|---|---|---|---|
| | Old District | New District | Old District | New District | Old District | New District |
| Student characteristics | | | | | | |
| Average cognitive ability | 50.1 | 50.7 | 50.1 | 50.7 | 49.8 | 50.9 |
| Average attitude toward school | 50.0 | 50.0 | 50.3 | 50.2 | 50.0 | 50.1 |
| Average student socioeconomic status | 49.9 | 50.2 | 49.7 | 50.3 | 49.7 | 50.3 |
| Student dropout rate | 6.8 | 6.0 | 6.8 | 6.3 | 6.8 | 4.9 |
| Percentage of white students in district | 87.7 | 91.6 | 87.7 | 89.4 | 88.2 | 94.8 |
| Change in student SES | | | | | | |
| Improvement in student cognitive ability | | | | | | |
| Size of district | | | | | | |
| Number of elementary schools | 19 | 17 | 14 | 20 | 21 | 5 |
| Number of teachers | 895 | 774 | 565 | 937 | 958 | 172 |
| Number of students | 22543 | 19489 | 13493 | 23576 | 24655 | 4158 |
| Region[b] | | | | | | |
| Detroit area | 36.3 | 28.1 | 35.8 | 30.2 | 27.7 | 15.4 |
| Southern Lower Peninsula | 54.7 | 58.0 | 52.8 | 60.4 | 56.9 | 69.2 |
| Northern Lower Peninsula | 6.6 | 10.0 | 7.5 | 5.7 | 15.4 | 13.8 |
| Upper Peninsula | 2.4 | 3.9 | 3.8 | 3.8 | 0.0 | 1.5 |
| Community type[b] | | | | | | |
| Large city | 15.9 | 14.3 | 13.2 | 15.1 | 16.9 | 0.0 |
| Small city | 3.9 | 7.5 | 13.2 | 17.0 | 6.2 | 10.8 |
| Urban fringe | 38.2 | 33.0 | 32.1 | 32.1 | 23.1 | 32.3 |
| Town | 15.4 | 16.5 | 15.1 | 17.0 | 20.0 | 24.6 |
| Rural area | 26.7 | 28.7 | 26.4 | 18.9 | 33.8 | 32.3 |
| District growth (% change in enrollment) | 0.03 | 0.03 | 0.02 | 0.02 | 0.03 | 0.03 |
| District wealth (state equalized value per resident pupil) | 15392 | 16031 | 15487 | 15475 | 14535 | 14346 |
| Class size (students per teacher) | 25.4 | 25.2 | 25.7 | 25.0 | 25.7 | 25.0 |
| Number of observations[c] | 697 | | 53 | | 65 | |

[a] See notes to Table 5.

## Appendix B

## DETERMINANTS OF TEACHERS' SALARIES

Table B-1 reports regression estimates of the effects of various personnel, assignment, and district characteristics on the annual salaries received by teachers who were in the Michigan System in 1970-71. The results for the district characteristics were discussed in the text and were found to be important determinants of teachers' salaries. Teacher personal characteristics and assignments, however, are probably more important. For example, the combined male and female regression (the regressions that are computed separately for males and females will be discussed shortly) indicates that, holding other factors constant, the annual salaries of teachers with Master's degrees and Ph.Ds are $1421 and $3604 more than salaries of teachers with only a Bachelor's degree, and that administrators receive $2926 more per year than regular teachers. For example, the first ten years of teaching, a period in which a permanent certificate is usually acquired, results in an average salary increase of almost $3500. The second ten years results in an additional increase of around $1500.

Two of the more interesting salary results are for black teachers and female teachers. The first column of Table B-1 implies that, controlling for other salary determinants, the average annual salaries of these two groups are $162 and $539 less than the salaries of their white and male counterparts. These results are surprising since, at least in larger school districts, teachers are paid according to a formula or schedule that is based on such factors as their experience, educational attainment, and assignment. Salary discrimination by race or sex ought to be impossible within these districts.[1] Perhaps, however, there are districts where salary is not so rigidly anchored to experience, degree level, and teaching assignments; if so, these districts are most likely small and located in towns and rural areas.

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[1] It is true that male teachers have more opportunity to augment their salary than female teachers through such supplementary activities as coaching. However, the salary variable used in the regressions is defined to exclude any additional earnings that result from supplementary activities.

Table B-1

REGRESSIONS ON ANNUAL SALARY

| Independent Variables | Males and Females | | Males Only | | Females Only | |
|---|---|---|---|---|---|---|
| | Coefficient | t-Ratio | Coefficient | t-Ratio | Coefficient | t-Ratio |
| Personal characteristics | | | | | | |
| Female = 1 | -539.09 | -17.25 | -- | -- | -- | -- |
| Race: Black = 1 | -161.52 | -2.81 | -200.18 | 1.70 | -90.85 | -1.54 |
| Years of experience | 334.40 | 51.88 | 400.68 | 30.72 | 302.59 | 45.76 |
| Years of experience squared | -6.39 | -43.55 | -7.73 | -25.97 | -5.76 | -38.35 |
| Age | 3.77 | 1.93 | 2.33 | 0.50 | 6.32 | 3.32 |
| Educational attainment | | | | | | |
| No degree = 1 | -1020.4 | -7.23 | -1306.9 | -2.77 | -1037.4 | -8.13 |
| Master's = 1 | 1421.4 | 42.70 | 1256.2 | 20.14 | 1473.7 | 41.02 |
| Ph.D. = 1 | 3604.1 | 30.51 | 3449.6 | 22.02 | 2530.9 | 12.03 |
| Out-of-state degree = 1 | 276.62 | 8.32 | 285.26 | 4.62 | 239.93 | 6.77 |
| Permanent certificate = 1 | 726.70 | 17.93 | 641.31 | 8.31 | 762.60 | 17.86 |
| Assignment | | | | | | |
| Teaching position | | | | | | |
| Administrator = 1 | 2925.8 | 49.59 | 2793.2 | 35.73 | 2467.5 | 22.76 |
| Special teacher = 1 | 148.54 | 3.38 | 203.87 | 2.47 | 216.23 | 4.61 |
| Teaching level | | | | | | |
| Junior high school = 1 | -5.03 | -0.04 | 34.63 | 0.53 | 42.35 | 1.00 |
| Senior high school = 1 | 74.37 | 2.10 | 139.69 | 2.19 | 42.20 | 1.05 |
| Mixed level school = 1 | 176.33 | 2.91 | 458.17 | 4.75 | -105.05 | -1.38 |
| Central administration = 1 | 2693.1 | 27.54 | 3735.7 | 28.37 | -448.54 | -2.79 |
| District characteristics | | | | | | |
| Student characteristics | | | | | | |
| Average cognitive ability | 27.19 | 4.33 | 51.40 | 4.58 | 9.473 | 1.38 |
| Average attitude toward school | -23.57 | -2.10 | -63.30 | -3.22 | 0.681 | 0.05 |
| Change in student SES[a] | -37.21 | -5.11 | -54.40 | -4.07 | -27.71 | -3.54 |
| Size of district | | | | | | |
| lg(number of elementary schools) | 96.37 | 4.99 | 89.05 | 2.52 | 111.43 | 5.37 |
| District wealth | | | | | | |
| State equalized value per resident pupil | 0.00941 | 4.31 | 0.00429 | 1.12 | 0.0140 | 5.82 |
| Region | | | | | | |
| Southern Lower Peninsula = 1 | -874.52 | -23.04 | -846.80 | -12.13 | -873.87 | -21.51 |
| Northern Lower Peninsula = 1 | -1324.2 | -18.58 | -1333.4 | -10.48 | -1316.6 | -16.96 |
| Upper Peninsula = 1 | -1322.2 | -15.33 | -1648.4 | -11.49 | -1043.7 | -10.41 |
| Community type | | | | | | |
| Small city = 1 | -399.34 | -5.97 | -293.65 | -2.36 | -415.13 | -5.87 |
| Urban fringe = 1 | -178.96 | -2.81 | -164.11 | -1.42 | -396.24 | -2.65 |
| Town = 1 | -433.94 | -5.90 | -469.67 | -3.52 | -182.04 | -5.00 |
| Rural = 1 | -613.00 | -7.80 | -683.74 | -4.81 | -549.37 | -6.47 |
| Intercept term | 8424.0 | | 8972.6 | | 7536.7 | |
| $R^2$ | 0.824 | | 0.825 | | 0.819 | |
| Mean of dependent variable | $11,450 | | $12,520 | | $10,830 | |
| Number of observations | 11,252 | | 4,888 | | 6,364 | |

[a]The absolute change between 1969-70 and 1970-71 in the socioeconomic status index for the teacher's district.

To investigate this possibility, we computed separate regressions for men and women teachers. The results indicate that women teachers actually fare *better* relative to men in small districts located in towns and rural areas than they do in large city districts. This is shown in Table B-2, where we examine the salaries of two hypothetical teachers, one male and one female, who are assumed to be employed at annual salaries of $10,000 each by a large city district with 120 elementary schools. The table indicates how the salaries of these two teachers would change if they transferred to school districts in other types of communities. The calculations are based on the regressions reported in Table B-1 and on the actual average number of elementary schools in each type of community. Table B-2 implies that women teachers are worse off than men in districts in small cities and suburbs and better off in towns and rural areas.

The results reported in Table B-2 suggest that it is improbable a district would pay a female teacher a lower salary than a male teacher with similar characteristics in a similar assignment. However, it is possible that, everything else equal, districts would prefer to hire male teachers than female teachers. If so, districts that pay high

Table B-2

MALE AND FEMALE SALARY DIFFERENCES BY DISTRICT SIZE

| Community Type | Average Number of Elementary Schools | Male Teacher's Salary[a] | Female Teacher's Salary[a] | Difference Between Male and Female Salaries |
|---|---|---|---|---|
| Large city | 120.4 | $10,000 | $10,000 | $ 0 |
| Small city | 11.4 | 9,496 | 9,322 | 174 |
| Urban fringe | 12.0 | 9,631 | 9,346 | 285 |
| Town | 4.6 | 9,240 | 9,455 | -215 |
| Rural area | 3.6 | 9,004 | 9,060 | -56 |

SOURCE: Table B-1.

[a]These estimates pertain to a hypothetical teacher who would earn $10,000 annually if employed by a large city district with 120 elementary schools.

salaries would have the greatest choice in whom to hire and consequently would hire proportionately more male teachers than would low salary districts. We examined this possibility by dividing districts into high and low salary categories. A district was assigned to the high category if the average salary paid by the district, adjusted for the average experience of teachers and the percentage of teachers with Master's degrees in the district, was higher than the average for all Michigan districts.[1] The remaining districts were assigned to the low salary category. In 1970-71, there was very little difference between the proportions of male teachers in each category: 37.6 percent of the teachers in the high salary districts were males, 38.8 percent in the low salary districts were males. Thus, the male-female salary differential indicated by the first column of Table B-1 does not seem to have resulted from male teachers being disproportionately located in high salary districts.

Our results so far imply that the male-female differential shown in the salary regression cannot be attributed to discrimination either in hiring women teachers or in the salaries they are paid after being hired. Although these results must be considered highly tentative, they suggest that the wage regression itself may be misspecified.[2] For example, although we could control for differences in degree levels between male and female teachers, we have no information on the exact number of college credit units Michigan teachers have accumulated. Teachers who have earned credits in excess of the bare minimum required for a BA or MA, even if they have not received the next higher degree, are frequently paid a higher salary than those who have not. Moreover,

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[1] More precisely, using the 638 Michigan school districts as units of observation, we estimated the following regression (t-values are in parentheses, $R^2 = 0.42$):

$$\text{Average District Salary} = \underset{(42.6)}{7731.3} + \underset{(1.97)}{37.65}\ (\text{average years of teaching experience}) + \underset{(17.11)}{65.30}\ (\text{percentage of teachers with Master's degrees}).$$

[2] Note, however, that the salary regression explains over 80 percent of the variance in the dependent variable, an extremely high percentage for regressions using disaggregated cross-sectional data and one that suggests considerable confidence can be placed in the predictive power of the estimates.

since almost twice as many male as female teachers in Michigan have MAs and over six times as many have Ph.D.s, it seems probable that the whole male distribution of credit units is to the right of the female distribution. If so, the average salary of males with BAs or MAs would be higher than that of females holding the same degree.

Although we cannot test to see what the effect of controlling for college credit units would be on the female wage coefficient in the Michigan salary regression, we can perform such a test for salary regressions computed on San Diego teachers. Non-administrative San Diego teachers are paid on the basis of a single published salary schedule. Since under this schedule salary depends entirely on years of experience and educational attainment, no differential is possible between comparable male and female teachers. Nevertheless, as the following regression indicates, when only experience and degree level are controlled for, such a differential appears to exist (t-values in parentheses, $R^2$ = 0.963):

$$\text{Annual Salary} = 7536 - \underset{(14)}{188}\,(\text{female}) + \underset{(259)}{453}\,(\text{years of experience}) + \underset{(66)}{1043}\,(\text{Master's degree})$$

However, when the MA dummy is replaced by a set of dummy variables more closely reflecting college units,[1] the estimated relation between a teacher's sex and salary almost disappears ($R^2$ = 0.998):

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[1]Teachers in San Diego are assigned to the following six salary classes on the basis of their educational attainment:

| Class | Educational Attainment |
|---|---|
| A | BA |
| B | BA + 11 semester hours |
| C | BA + 36 semester hours or MA |
| D | BA + 60 semester hours or BA + 54 semester hours with MA |
| E | BA + 72 semester hours with MA |
| F | BA + 90 semester hours with MA |

$$\text{Annual Salary} = 7080 - \underset{(2)}{7}\,(\text{female}) + \underset{(909)}{399}\,(\text{years of experience}) + \underset{(74)}{470}\,(\text{Class B}) + \underset{(167)}{970}\,(\text{Class C}) + \underset{(233)}{1493}\,(\text{Class D}) + \underset{(244)}{2037}\,(\text{Class E}) + \underset{(374)}{2680}\,(\text{Class F}).$$

These results suggest that the male-female salary differential shown in Table B-1 may be a statistical artifact. However, none of our tests of alternative explanations for the differential can be considered more than merely suggestive. For this reason and because of the important role of women in public education, possible discrimination against female teachers is a subject that deserves considerable further study. Moreover, as some of our other results suggest, even if discrimination against women does not occur in salary, it may in other areas such as promotion.

# Appendix C

## MICHIGAN EDUCATIONAL DATA

The teacher sample file that is used in this study was drawn from a much larger set of data, which we call the Michigan Teacher, School, and District File, or simply the Michigan file. Data for the Michigan file were provided by the Michigan Department of Education and assembled at Rand. Only part of the data in this file are used in this study. In the first part of this appendix, the content and format of the Michigan file are described in some detail; in the second part, we present a brief description of the specific subfile used for the present study.

### I. DESCRIPTION OF THE MICHIGAN TEACHER, SCHOOL, AND DISTRICT FILE[1]

The Michigan file is divided into three separate subfiles. One of these is a school subfile with information collected during the 1969-70 and 1970-71 school years, a second is a district subfile with information collected during the same years, and a third is a personnel subfile covering the four school years from 1967-71. Since each teacher can be located with reference to building and district assignments (with the exceptions noted below), it is possible to construct a four-year longitudinal data file with teachers as the unit of observation and to assign these values for their personal characteristics such as age, sex, race, and years of teaching experience and values characterizing the districts in which they were employed in each year. Although the district data cover only two years, we found it useful to assign variables describing a district in 1969-70 or 1970-71 to a teacher located in that district in an earlier year. If district characteristics do not change much from year to year, as is usually the case, little is lost by this procedure, and a much richer data file is constructed. At present, it is possible to match the teacher personnel data to the

[1]This part of the appendix was prepared by Frank Berger.

school building data for only a single year (1970-71), since the teacher's building assignment is available only for the 1970-71 school year. However, if Rand obtains the 1971-72 Michigan personnel data, which also contains teachers' building assignments, a two-year longitudinal file can be constructed from the school data as well.

## EDUCATIONAL ASSESSMENT PROGRAM DATA

The data necessary to compute each of the school and district variables came from two sources: (1) Michigan Department of Education records such as the "Fourth Friday report,"[1] and (2) the Michigan Educational Assessment Battery.[2] The battery is given on a statewide basis to 4th and 7th grade pupils and is designed to obtain information on basic skills, socioeconomic background, and various attitudes of students. Scores have been scaled so that the pupil mean score from any assessment battery is 50, and the standard deviation is ten, when computed for all pupils at the same grade level.

### Individual School Data

The school data were originally received on two tapes, one for each of the two school years covered. These tapes have been merged and redundant material has been deleted. The final tape contains information on 3886 schools in 1969-70 and 4029 schools in 1970-71. In all, information is included on 4118 different schools. Table C-1 lists all the variables by name and includes format information, means, standard deviations, maxima, minima, and numbers of observations. In calculating the mean values, the individual school serves as the unit of observation. Variable names in many cases are self-explanatory; therefore, only those variables that require additional clarification are discussed below.

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[1]The State School Act stipulates that the fourth Friday after Labor Day is the official day for collecting enrollment data in Michigan schools.

[2]For further information on the Michigan Educational Assessment Battery, including the precise nature of all assessment tests, contact Robert J. Huyer, Supervisor, Assessment Program, Department of Education, Lansing, Michigan 48902.

Table C-1

SCHOOL TAPE[a]

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| County | | F2.0 | 4118 | | | | |
| District | | F3.0 | 4118 | | | | |
| School number | | F4.0 | 4118 | | | | |
| Community type | | F1.0 | 4117 | | | | |
| Region | | F1.0 | 3886 | | | | |
| T if tested in 69-70 | | A1 | 3153 | | | | |
| 4 if tested 4th grade 69-70 | | F1.0 | 2540 | | | | |
| 7 if tested 7th grade 69-70 | | F1.0 | 958 | | | | |
| School type | | A1 | 4057 | | | | |
| School name | | A28 | | | | | |
| 4th grade 69-70 SES | Mean | F7.4 | 2486 | 49.64 | 4.68 | 71.50 | 36.87 |
| | S.D.[b] | F7.4 | 2486 | 8.28 | 1.71 | 14.27 | 0.00 |
| | N | F5.0 | 2486 | 61.29 | 35.55 | 355.00 | 1.00 |
| Achievement attitude | Mean | F7.4 | 2486 | 49.72 | 2.94 | 59.72 | 23.35 |
| | S.D. | F7.4 | 2486 | 9.17 | 1.94 | 14.63 | 0.00 |
| | N | F5.0 | 2486 | 61.24 | 35.53 | 356.00 | 1.00 |
| Self attitude | Mean | F7.4 | 2485 | 49.95 | 2.97 | 69.54 | 29.66 |
| | S.D. | F7.4 | 2485 | 9.12 | 1.54 | 14.51 | 0.00 |
| | N | F5.0 | 2485 | 61.30 | 35.53 | 356.00 | 1.00 |
| School attitude | Mean | F7.4 | 2486 | 50.31 | 3.54 | 68.74 | 30.45 |
| | S.D. | F7.4 | 2486 | 8.84 | 1.70 | 13.90 | 0.00 |
| | N | F5.0 | 2486 | 61.28 | 35.55 | 356.00 | 1.00 |
| Vocabulary | Mean | F7.4 | 2540 | 50.23 | 4.33 | 69.34 | 32.76 |
| | S.D. | F7.4 | 2540 | 8.89 | 1.65 | 13.39 | 0.00 |
| | N | F5.0 | 2540 | 62.13 | 35.81 | 358.00 | 1.00 |
| Reading | Mean | F7.4 | 2540 | 50.30 | 4.35 | 65.98 | 29.88 |
| | S.D. | F7.4 | 2540 | 8.84 | 1.48 | 14.79 | 0.00 |
| | N | F5.0 | 2540 | 62.11 | 35.80 | 356.00 | 1.00 |

Table C-1--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 69-70 (cont.) | | | | | | | |
| English expression | Mean | F7.4 | 2539 | 50.27 | 4.36 | 63.23 | 30.45 |
| | S.D. | F7.4 | 2539 | 8.82 | 1.46 | 14.10 | 0.00 |
| | N | F5.0 | 2539 | 62.12 | 35.83 | 356.00 | 1.00 |
| Math | Mean | F7.4 | 2539 | 50.32 | 4.42 | 67.92 | 30.07 |
| | S.D. | F7.4 | 2539 | 8.85 | 1.42 | 12.65 | 0.00 |
| | N | F5.0 | 2539 | 62.07 | 35.74 | 354.00 | 1.00 |
| Composite | Mean | F7.4 | 2539 | 50.31 | 4.23 | 64.10 | 34.75 |
| | S.D. | F7.4 | 2539 | 7.92 | 1.31 | 11.44 | 0.00 |
| | N | F5.0 | 2539 | 61.79 | 35.48 | 353.00 | 1.00 |
| 7th grade 69-70 SES | Mean | F7.4 | 944 | 48.34 | 4.66 | 70.74 | 34.26 |
| | S.D. | F7.4 | 944 | 8.17 | 2.04 | 13.30 | 0.00 |
| | N | F5.0 | 944 | 162.02 | 130.79 | 655.00 | 1.00 |
| Achievement attitude | Mean | F7.4 | 944 | 49.83 | 3.19 | 61.15 | 19.12 |
| | S.D. | F7.4 | 944 | 9.34 | 2.14 | 14.34 | 0.00 |
| | N | F5.0 | 944 | 161.76 | 130.52 | 657.00 | 1.00 |
| Self attitude | Mean | F7.4 | 943 | 49.72 | 3.12 | 67.45 | 23.53 |
| | S.D. | F7.4 | 943 | 9.29 | 2.16 | 13.08 | 0.00 |
| | N | F5.0 | 943 | 162.15 | 130.71 | 657.00 | 1.00 |
| School attitude | Mean | F7.4 | 943 | 50.61 | 4.03 | 64.49 | 25.68 |
| | S.D. | F7.4 | 943 | 9.02 | 2.19 | 15.38 | 0.00 |
| | N | F5.0 | 943 | 162.21 | 130.76 | 657.00 | 1.00 |
| Vocabulary | Mean | F7.4 | 957 | 49.71 | 4.14 | 67.48 | 30.21 |
| | S.D. | F7.4 | 957 | 8.76 | 1.92 | 14.88 | 0.00 |
| | N | F5.0 | 957 | 165.47 | 131.79 | 657.00 | 1.00 |
| Reading | Mean | F7.4 | 957 | 49.98 | 3.85 | 64.92 | 25.04 |
| | S.D. | F7.4 | 957 | 8.89 | 1.94 | 14.57 | 0.00 |
| | N | F5.0 | 957 | 165.41 | 131.74 | 656.00 | 1.00 |
| English expression | Mean | F7.4 | 956 | 50.05 | 3.95 | 65.86 | 30.42 |
| | S.D. | F7.4 | 956 | 8.82 | 1.93 | 15.29 | 0.00 |
| | N | F5.0 | 956 | 165.46 | 131.59 | 643.00 | 1.00 |

Table C-1--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 7th grade 69-70 (cont.) | | | | | | | |
| Math | Mean | F7.4 | 956 | 50.12 | 4.31 | 66.35 | 24.89 |
| | S.D. | F7.4 | 956 | 8.66 | 1.94 | 13.06 | 0.00 |
| | N | F5.0 | 956 | 165.23 | 131.30 | 640.00 | 1.00 |
| Composite | Mean | F7.4 | 956 | 50.07 | 3.83 | 63.49 | 31.84 |
| | S.D. | F7.4 | 956 | 7.78 | 1.75 | 12.88 | 0.00 |
| | N | F5.0 | 956 | 164.24 | 130.08 | 626.00 | 1.00 |
| Pupils per teacher (68-69) | | F5.1 | 3838 | 26.63 | 5.37 | 67.00 | 3.00 |
| Pupils per staff (68-69) | | F5.1 | 3838 | 23.15 | 5.12 | 67.00 | 3.00 |
| % staff minority[c] (68-69) | | F5.1 | 3838 | 6.16 | 15.62 | 95.10 | 0.00 |
| % pupils minority[c] (68-69) | | F5.1 | 3838 | 11.38 | 24.78 | 100.00 | 0.00 |
| % pupils Special Education[c] (68-69) | | F5.1 | 3838 | 2.08 | 9.54 | 100.00 | 0.00 |
| % pupils Pre-Kindergarten[c] (68-69) | | F5.1 | 3838 | 0.27 | 3.51 | 100.00 | 0.00 |
| Title I (68-69) | | F1.0 | 4118 | 0.434 | 0.50 | 1.00 | 0.00 |
| Staff size 69-70 (full-time equivalency) | | F7.1 | 3944 | 22.83 | 20.40 | 197.00 | 0.20 |
| No. pupils 69-70 (full-time equivalency) | | F7.0 | 3934 | 494.511 | 427.92 | 4300.00 | 3.00 |
| Pupils per staff 69-70 (full-time equivalency) | | F7.2 | 3934 | 22.30 | 4.08 | 47.00 | 1.50 |
| No. teachers 69-70 (full-time equivalency) | | F7.2 | 3940 | 20.04 | 17.62 | 178.00 | 0.30 |
| Pupils per teacher 69-70 (full-time equivalency) | | F7.2 | 3933 | 25.05 | 4.06 | 48.00 | 2.00 |
| No. white pupils 69-70 | | F7.0 | 3965 | 466.53 | 395.02 | 3652.00 | 1.00 |
| No. pupils 69-70 | | F7.0 | 4008 | 543.25 | 441.40 | 4300.00 | 5.00 |
| % white pupils 69-70 | | F7.2 | 3965 | 89.19 | 23.58 | 100.00 | 0.06 |
| No. teachers 69-70 | | F7.0 | 4012 | 21.98 | 18.67 | 306.00 | 1.00 |
| No. teachers over 5 yrs. experience (69-70) | | F7.0 | 3956 | 12.71 | 12.10 | 200.00 | 1.00 |
| % teachers over 5 yrs. experience (69-70) | | F7.2 | 3955 | 58.50 | 19.36 | 100.00 | 0.89 |
| No. teachers with Master's (69-70) | | F7.0 | 3442 | 7.38 | 10.05 | 121.00 | 1.00 |
| % teachers with Master's (69-70) | | F7.2 | 3441 | 26.92 | 15.12 | 100.00 | 3.03 |

Table C-1--Continued

| Variable Name | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|
| No. teachers with salary greater than $11,000 (69-70) | F7.0 | 3452 | 10.67 | 11.88 | 149.00 | 1.00 |
| % teachers with salary greater than $11,000 (69-70) | F7.2 | 3452 | 42.75 | 21.35 | 101.59 | 0.83 |
| Innovative programs and services (70-71) | | | | | | |
| Innovative facilities | F1.0 | 3636 | 1.98 | | | |
| Computerized instructional programs | F1.0 | 3810 | 1.72 | | | |
| Educational TV | F1.0 | 3721 | 1.82 | | | |
| Language laboratories | F1.0 | 3767 | 1.70 | | | |
| Science laboratories | F1.0 | 2816 | 1.91 | | | |
| Other | F1.0 | 3966 | 0.82 | | | |
| Total (facilities) | | | | | | |
| Innovative practices | F1.0 | 3800 | 1.70 | | | |
| Team teaching | F1.0 | 3744 | 1.82 | | | |
| Non-graded organization | F1.0 | 3606 | 1.97 | | | |
| Modular scheduling | F1.0 | 2942 | 1.85 | | | |
| Other | F1.0 | 3962 | 0.60 | | | |
| Total (practices) | | | | | | |
| Innovative services | F1.0 | 3936 | 1.09 | | | |
| Speech correction program | F1.0 | 3598 | 1.51 | | | |
| Guidance program | F1.0 | 3780 | 1.26 | | | |
| Remedial reading program | F1.0 | 3682 | 1.26 | | | |
| Health services program | F1.0 | 3286 | 1.92 | | | |
| Advanced grammar program | F1.0 | 3304 | 1.86 | | | |
| Advanced reading program | | | | | | |
| Availability of specialized music teachers | F1.0 | 3860 | 1.17 | | | |
| Availability of specialized arts teachers | F1.0 | 3727 | 1.34 | | | |
| Total (services) | F1.0 | 3997 | 4.33 | | | |

Table C-1--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| T if tested 70-71 | | A1 | 3230 | | | | |
| 4 if tested 70-71 4th grade | | F1.0 | 2532 | | | | |
| 7 if tested 70-71 7th grade | | F1.0 | 908 | | | | |
| 4th grade 70-71 Vocabulary | Mean | F7.4 | 2544 | 50.25 | 4.34 | 69.00 | 34.00 |
| | S.D. | F7.4 | 2544 | 8.88 | 1.64 | 14.87 | 0.00 |
| | N | F5.0 | 2544 | 63.02 | 36.11 | 336.00 | 1.00 |
| Reading | Mean | F7.4 | 2544 | 50.36 | 4.33 | 63.21 | 34.00 |
| | S.D. | F7.4 | 2544 | 8.72 | 1.56 | 12.84 | 0.00 |
| | N | F5.0 | 2544 | 63.07 | 36.16 | 336.00 | 1.00 |
| Mechanics of written English | Mean | F7.4 | 2544 | 50.20 | 4.37 | 66.00 | 29.00 |
| | S.D. | F7.4 | 2544 | 8.79 | 1.37 | 13.59 | 0.00 |
| | N | F5.0 | 2544 | 63.03 | 36.15 | 336.00 | 1.00 |
| Math | Mean | F7.4 | 2544 | 50.40 | 4.54 | 65.00 | 31.00 |
| | S.D. | F7.4 | 2544 | 8.75 | 1.46 | 14.14 | 0.00 |
| | N | F5.0 | 2544 | 62.90 | 36.01 | 336.00 | 1.00 |
| Composite | Mean | F7.4 | 2544 | 50.35 | 4.27 | 64.00 | 35.00 |
| | S.D. | F7.4 | 2544 | 7.96 | 1.33 | 12.28 | 0.00 |
| | N | F5.0 | 2544 | 62.47 | 35.63 | 336.00 | 1.00 |
| 7th grade 70-71 Vocabulary | Mean | F7.4 | 918 | 49.83 | 4.05 | 68.00 | 36.00 |
| | S.D. | F7.4 | 918 | 8.91 | 1.66 | 17.00 | 0.00 |
| | N | F5.0 | 918 | 174.97 | 136.35 | 867.00 | 1.00 |
| Reading | Mean | F7.4 | 918 | 50.27 | 3.96 | 65.00 | 31.00 |
| | S.D. | F7.4 | 918 | 8.99 | 1.73 | 13.00 | 0.00 |
| | N | F5.0 | 918 | 175.04 | 136.40 | 867.00 | 1.00 |
| Mechanics of written English | Mean | F7.4 | 917 | 49.99 | 3.97 | 61.00 | 31.00 |
| | S.D. | F7.4 | 917 | 9.07 | 1.74 | 16.62 | 0.00 |
| | N | F5.0 | 917 | 175.23 | 136.35 | 870.00 | 1.00 |

Table C-1--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 7th grade 70-71 (cont.) | | | | | | | |
| Math | Mean | F7.4 | 917 | 50.21 | 4.59 | 64.00 | 25.00 |
| | S.D. | F7.4 | 917 | 8.75 | 1.75 | 16.65 | 0.00 |
| | N | F5.0 | 917 | 174.69 | 135.62 | 868.00 | 1.00 |
| Composite | Mean | F7.4 | 917 | 50.19 | 4.00 | 62.00 | 34.00 |
| | S.D. | F7.4 | 917 | 8.02 | 1.56 | 12.50 | 0.00 |
| | N | F5.0 | 917 | 172.68 | 133.73 | 865.00 | 1.00 |
| 4th grade 70-71 SES | Mean | F7.4 | 2478 | 49.86 | 4.66 | 66.00 | 25.00 |
| | S.D. | F7.4 | 2478 | 8.65 | 1.66 | 15.57 | 0.00 |
| | N | F5.0 | 2478 | 61.82 | 34.91 | 337.00 | 1.00 |
| Achievement attitude | Mean | F7.4 | 2478 | 49.86 | 2.94 | 61.00 | 27.00 |
| | S.D. | F7.4 | 2478 | 9.48 | 1.72 | 14.28 | 0.00 |
| | N | F5.0 | 2478 | 61.81 | 34.88 | 337.00 | 1.00 |
| Self attitude | Mean | F7.4 | 2478 | 49.94 | 2.73 | 64.67 | 31.00 |
| | S.D. | F7.4 | 2478 | 9.57 | 1.47 | 19.00 | 0.00 |
| | N | F5.0 | 2478 | 61.80 | 34.87 | 337.00 | 1.00 |
| School attitude | Mean | F7.4 | 2478 | 50.02 | 2.95 | 68.00 | 36.00 |
| | S.D. | F7.4 | 2478 | 9.48 | 1.71 | 15.03 | 0.00 |
| | N | F5.0 | 2478 | 61.78 | 34.84 | 337.00 | 1.00 |
| 7th grade 70-71 SES | Mean | F7.4 | 902 | 49.64 | 4.21 | 66.00 | 25.00 |
| | S.D. | F7.4 | 902 | 8.44 | 2.25 | 16.70 | 0.00 |
| | N | F5.0 | 902 | 168.62 | 133.77 | 877.00 | 1.00 |
| Achievement attitude | Mean | F7.4 | 902 | 49.67 | 3.31 | 63.00 | 26.00 |
| | S.D. | F7.4 | 902 | 9.40 | 2.20 | 16.00 | 0.00 |
| | N | F5.0 | 902 | 168.54 | 133.68 | 876.00 | 1.00 |
| Self attitude | Mean | F7.4 | 902 | 49.51 | 2.75 | 64.00 | 32.00 |
| | S.D. | F7.4 | 902 | 9.37 | 2.20 | 17.50 | 0.00 |
| | N | F5.0 | 902 | 168.48 | 133.63 | 876.00 | 1.00 |
| School attitude | Mean | F7.4 | 902 | 50.27 | 2.93 | 66.00 | 26.00 |
| | S.D. | F7.4 | 902 | 9.25 | 2.17 | 22.00 | 0.00 |
| | N | F5.0 | 902 | 168.43 | 133.57 | 877.00 | 1.00 |

Table C-1--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 70-71 Friendly | Mean | F7.4 | 2478 | 50.26 | 3.22 | 67.00 | 20.00 |
| | S.D. | F7.4 | 2478 | 9.30 | 1.65 | 17.00 | 0.00 |
| | N | F5.0 | 2478 | 61.80 | 34.87 | 337.00 | 1.00 |
| Family solidarity | Mean | F7.4 | 2478 | 50.21 | 3.88 | 60.00 | 17.00 |
| | S.D. | F7.4 | 2478 | 8.84 | 2.22 | 18.00 | 0.00 |
| | N | F5.0 | 2478 | 61.83 | 34.91 | 337.00 | 1.00 |
| Educational-economic advantage | Mean | F7.4 | 2478 | 49.63 | 4.18 | 65.63 | 30.00 |
| | S.D. | F7.4 | 2478 | 8.96 | 1.53 | 15.20 | 0.00 |
| | N | F5.0 | 2478 | 61.83 | 34.91 | 337.00 | 1.00 |
| 7th grade 70-71 Friendly | Mean | F7.4 | 902 | 50.31 | 3.52 | 72.00 | 18.00 |
| | S.D. | F7.4 | 902 | 9.10 | 2.15 | 14.31 | 0.00 |
| | N | F5.0 | 902 | 168.47 | 133.62 | 876.00 | 1.00 |
| Family solidarity | Mean | F7.4 | 902 | 50.91 | 3.82 | 64.00 | 31.00 |
| | S.D. | F7.4 | 902 | 8.74 | 2.59 | 17.35 | 0.00 |
| | N | F5.0 | 902 | 168.67 | 133.81 | 877.00 | 1.00 |
| Educational-economic advantage | Mean | F7.4 | 902 | 48.72 | 4.62 | 73.00 | 22.00 |
| | S.D. | F7.4 | 902 | 8.56 | 2.01 | 15.50 | 0.00 |
| | N | F5.0 | 902 | 168.68 | 133.81 | 877.00 | 1.00 |

[a]All missing values on the school tape are either 0 or blank, although a zero value for a standard deviation variable may be legitimate if only one student took that test.

[b]Because some schools had only one student take an assessment battery, the samples chosen to obtain the mean and standard deviation of the standard deviation variable are those with non-zero values for the mean variable.

[c]Because these variables can take 0 as a legitimate value, 0 could not be used as a missing value. Therefore, the sample on which these means are based includes only those observations where pupils/teacher and pupils/staff are not 0.

County. Identifies the county in which a school is located.

District. To identify a school district, the county and district codes *must be used together* as a single five-character variable.

School Number. Each of the schools within the state has been assigned a unique school number.

Community Type. Describes the type of community in which each school is located:

1. Metropolitan core: One or more adjacent cities with a population of 50,000 or more that serve as the economic focal point of their environs.
2. City: A community of 10,000 to 50,000 that serves as the economic focal point of its environs.
3. Town: A community of 2,500 to 10,000 that serves as the economic focal point of its environs.
4. Urban Fringe: A community of any population size that has as its economic focal point a metropolitan core or a city.
5. Rural: A community of less than 2,500.

Region: Identifies the geographical region in which each school is located:

1. Wayne, Oakland, and Macomb counties.
2. All counties in Southern Michigan that are south of and including Muskegon, Kent, Montcalm, Gratiot, Midland, and Bay counties, excluding counties in region 1.
3. All counties that are north of the above-mentioned line and that are in the lower peninsula.
4. All counties that are in the upper peninsula.

School Type. Describes whether the school is elementary, junior high, etc.

A. Elementary school--pre-kindergarten or kindergarten through grade 6 or 8.
B. Junior high school--grades 7-8 or 7-9.
C. Senior high school--grades 9-12 or 10-12.
D. Middle school.
E. Junior-Senior high school--grades 7-12.

Socioeconomic Status (SES) (1969-70 and 1970-71). Based on questions included in the assessment battery that were designed to assess group

socioeconomic background. The questions concerned biographical information, educational attainment of parents, quality of housing, family structure and stability, occupation, income, and possessions.

Importance of School Achievement (1969-70 and 1970-71). A high score indicates that, on the average, pupils at a particular school believe that good school achievement is important.

Attitude Toward School (1969-70 and 1970-71). A high score indicates that, on the average, pupils at a particular school have a positive attitude toward school.

Attitude Toward Self (1969-70 and 1970-71). A high score indicates that, on the average, pupils at a particular school believe themselves to be capable in school situations.

In the 1970-71 Educational Assessment Program a more detailed analysis was done on the questions in the assessment battery pertaining to socioeconomic status and attitudes. In addition to the measures reported above, three other measures were reported in 1970-71:

Family Solidarity (1970-71). The questions that were weighted most heavily to obtain this measure involved living with both parents, one's natural parents, home ownership, remaining in one area and therefore attending few different schools, father being employed, and family ownership of two or more cars.

Educational-Economic Advantage (1970-71). The questions that were weighted most heavily to obtain this measure involved having well-educated parents, living in a fairly large house, attending nursery school, having flown on an airplane, and family possessions such as a dishwasher and a typewriter. The SES variable used in 1970-71 is the mean of "family solidarity" and "educational-economic advantage" and is reputed to be comparable to the SES measure used in 1969-70.

Friendly (1970-71). The questions that were weighted most heavily to obtain this variable involved being liked by and liking one's classmates, being generally happy, and liking the school one is attending.

Vocabulary (1969-70 and 1970-71). The assessment battery included verbal analogy problems that measured students' knowledge of the meaning of words and their relationships.

Reading (1969-70 and 1970-71). The assessment battery included questions that tested students' reading achievement, vocabulary, and paragraph comprehension.

English Expression (1969-70). The assessment battery included questions that tested students' ability to recognize errors in spelling; use effective expression; identify correct word choices; and apply rules of grammar, punctuation, and capitalization.

Mechanics of Written English (1970-71). The test administered in 1970-71 differed in detail but not in substance from that used in 1969-70.

Mathematics (1969-70 and 1970-71). The assessment battery included questions that tested pupils' achievement in reasoning and problem solving; geometry and measurement; numbers and operations; relations, functions, and graphs; and mathematical sentences and systems.

Composite Achievement (1969-70 and 1970-71). Obtained by averaging the scores of the reading, English expression (mechanics of written English in 1970-71), and mathematics sections of the battery. The vocabulary score was not averaged into the composite achievement score.

Pupils per Teacher (1968-69 and 1969-70). 1968-69 measure is based on a head count, whereas the 1969-70 measure is expressed in terms of full-time equivalency (F.T.E.). Kindergarten, special education, and non-classroom teachers are not included in the number of teachers.

Pupils per Professional-Instructional Staff (1968-69 and 1969-70). The 1968-69 measure is based on a head count, whereas the 1969-70 measure is expressed in terms of full-time equivalency. Professional-Instructional Staff includes administrators, consultants and supervisors, classroom teachers, librarians, audio-visual staff, guidance personnel and school counselors, psychological staff, radio and television instructional staff, teachers of the homebound, and other instructional staff.

Percent of Teachers Earning $11,000 or More (1969-70). Teachers were considered to earn $11,000 or more if their contractual salary for the academic year (excluding summer) was at least that amount. Supplementary money paid for such responsibilities as coaching was not included as part of the contractual salary. Part-time teachers were considered to earn at least $11,000 if their full-time salary would at least equal that figure.

Innovative Programs and Services. The 1970-71 Fourth Friday Program included a section designed to determine whether each school has certain innovative facilities, practices, and services. The responses are coded: 1 = yes, 2 = no. "Total" refers to the number checked "yes" in each section.

Title I. Under Title I of the Federal Elementary and Secondary Education Act of 1965, local school districts are eligible to receive funds for programs to meet the needs of educationally deprived children, regardless of whether these children attend public or nonpublic schools. The Title I variable indicates whether a school had a Title I program in 1969-70 (1 = yes, 0 = no).

District Data

The district data were also received on two tapes that have been merged and consolidated. The district tape contains many of the variables contained on the school tape but computed with the district (rather than the school) as the unit of observation. In addition, certain variables pertaining to district resources and finances were included. Data are reported for 636 school districts in 1969-70 and for 620 districts in 1970-71. In all, information is included on 638 different school districts. Tape format information, means, standard deviations, maxima, minima, and numbers of observations for the variables in the district file are presented in Table C-2. Only those variables that require additional clarification will be discussed.

To avoid confusion, distinction should be made between two related but different sets of terms: (1) "per pupil" or "per state aid member" refers to all pupils legally enrolled in the district. The count includes prorated portions of instructional time spent by private school

Table C-2

DISTRICT FILE[a]

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| County | | F2.0 | 638 | | | | |
| District | | F3.0 | 638 | | | | |
| Community type | | F1.0 | | | | | |
| Region | | F1.0 | 638 | | | | |
| 4 if tested in fourth grade 69-70 | | F1.0 | 623 | | | | |
| 7 if tested in seventh grade 69-70 | | F1.0 | 592 | | | | |
| Grade range | | A3 | | | | | |
| District name | | A28 | | | | | |
| Local revenue per pupil (68-69) | | F6.0 | 634 | 339.02 | 485.07 | 11795.00 | 62.00 |
| State school aid per pupil (68-69) | | F5.0 | 629 | 300.22 | 72.38 | 740.00 | 5.00 |
| Instructional revenue per pupil (68-69) | | F6.0 | 634 | 426.66 | 198.19 | 4694.00 | 136.00 |
| Total operating expenses per pupil (68-69) | | F6.0 | 634 | 587.45 | 324.74 | 7945.00 | 165.00 |
| State equalized valuation per pupil (68-69) | | F7.0 | 636 | 15561.91 | 36752.73 | 915461.00 | 1993.00 |
| Average teacher salary (68-69) | | F7.0 | 590 | 8121.65 | 1195.40 | 12180.00 | 2732.00 |
| % teachers with Master's (68-69) | | F4.1 | 533 | 19.35 | 10.03 | 58.00 | 2.00 |
| Average teacher experience (68-69) | | F4.1 | 592 | 10.02 | 3.54 | 37.00 | 1.00 |
| Pupils per teacher (68-69) | | F5.1 | 592 | 24.19 | 3.82 | 57.00 | 1.00 |
| 4th grade 69-70 SES[b] | Mean | F4.1 | 618 | 48.30 | 3.49 | 71.50 | 37.10 |
| | S.D. | F4.1 | 618 | 8.29 | 2.00 | 12.10 | 0.00 |
| | N | F6.0 | 618 | 246.55 | 826.15 | 18797.00 | 1.00 |
| Achievement attitude[b] | Mean | F4.1 | 618 | 49.07 | 2.89 | 59.20 | 33.50 |
| | S.D. | F4.1 | 618 | 9.72 | 2.26 | 14.30 | 0.00 |
| | N | F6.0 | 618 | 246.34 | 823.81 | 18735.00 | 1.00 |
| Self attitude[b] | Mean | F4.1 | 618 | 49.67 | 3.01 | 69.50 | 30.30 |
| | S.D. | F4.1 | 618 | 9.33 | 2.00 | 14.50 | 0.00 |
| | N | F6.0 | 618 | 246.48 | 825.23 | 18775.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 69-70 (cont.) | | | | | | | |
| School attitude[b] | Mean | F4.1 | 618 | 51.25 | 2.89 | 66.10 | 30.50 |
| | S.D. | F4.1 | 618 | 8.97 | 2.04 | 14.90 | 0.00 |
| | N | F6.0 | 618 | 246.52 | 825.47 | 18778.00 | 1.00 |
| Vocabulary[b] | Mean | F4.1 | 623 | 50.58 | 3.34 | 69.30 | 32.8 |
| | S.D. | F4.1 | 623 | 8.92 | 1.82 | 13.40 | 0.00 |
| | N | F6.0 | 623 | 253.31 | 889.27 | 20586.00 | 1.00 |
| Reading[b] | Mean | F4.1 | 623 | 50.94 | 3.36 | 66.00 | 34.70 |
| | S.D. | F4.1 | 623 | 8.82 | 1.81 | 14.80 | 0.00 |
| | N | F6.0 | 623 | 253.22 | 888.79 | 20575.00 | 1.00 |
| English expression[b] | Mean | F4.1 | 623 | 50.88 | 3.36 | 63.20 | 30.40 |
| | S.D. | F4.1 | 623 | 8.76 | 1.87 | 14.10 | 0.00 |
| | N | F6.0 | 623 | 253.18 | 889.98 | 20609.00 | 1.00 |
| Mathematics[b] | Mean | F4.1 | 623 | 50.81 | 3.65 | 67.90 | 30.10 |
| | S.D. | F4.1 | 623 | 8.80 | 1.82 | 11.70 | 0.00 |
| | N | F6.0 | 623 | 252.97 | 887.67 | 20548.00 | 1.00 |
| Composite[b] | Mean | F4.1 | 623 | 50.89 | 3.25 | 64.10 | 35.40 |
| | S.D. | F4.1 | 623 | 7.90 | 1.66 | 11.40 | 0.00 |
| | N | F6.0 | 623 | 251.81 | 878.21 | 20304.00 | 1.00 |
| 7th grade 69-70 SES[b] | Mean | F4.1 | 588 | 47.71 | 3.87 | 65.16 | 34.30 |
| | S.D. | F4.1 | 588 | 8.25 | 1.77 | 11.20 | 0.00 |
| | N | F6.0 | 588 | 260.11 | 787.64 | 17278.00 | 1.00 |
| Achievement attitude[b] | Mean | F4.1 | 588 | 49.41 | 2.66 | 60.90 | 25.50 |
| | S.D. | F4.1 | 588 | 9.55 | 1.73 | 12.90 | 0.00 |
| | N | F6.0 | 588 | 259.76 | 785.26 | 17220.00 | 1.00 |
| Self attitude[b] | Mean | F4.1 | 588 | 49.53 | 2.72 | 67.40 | 37.80 |
| | S.D. | F4.1 | 588 | 9.46 | 1.83 | 13.10 | 0.00 |
| | N | F6.0 | 588 | 260.05 | 786.68 | 17252.00 | 1.00 |
| School attitude[b] | Mean | F4.1 | 588 | 51.79 | 3.23 | 64.50 | 25.70 |
| | S.D. | F4.1 | 588 | 9.14 | 1.86 | 13.90 | 0.00 |
| | N | F6.0 | 588 | 270.14 | 787.31 | 17268.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 7th grade 69-70 (cont.) | | | | | | | |
| Vocabulary[b] | Mean | F4.1 | 592 | 50.17 | 3.11 | 61.80 | 33.80 |
| | S.D. | F4.1 | 592 | 9.03 | 1.52 | 14.90 | 0.00 |
| | N | F6.0 | 592 | 267.49 | 855.42 | 19149.00 | 1.00 |
| Reading[b] | Mean | F4 1 | 592 | 50.62 | 2.73 | 62.20 | 35.80 |
| | S.D. | F4.1 | 592 | 9.16 | 1.57 | 14.60 | 0.00 |
| | N | F6.0 | 592 | 267.40 | 854.85 | 19134.00 | 1.00 |
| English expression[b] | Mean | F4.1 | 592 | 50.65 | 3.07 | 65.90 | 30.40 |
| | S.D. | F4.1 | 592 | 9.04 | 1.56 | 13.30 | 0.00 |
| | N | F6.0 | 592 | 267.20 | 855.23 | 19145.00 | 1.00 |
| Mathematics[b] | Mean | F4.1 | 592 | 50.94 | 3.17 | 63.50 | 34.00 |
| | S.D. | F4.1 | 592 | 8.99 | 1.49 | 12.00 | 0.00 |
| | N | F6.0 | 592 | 266.82 | 849.35 | 18990.00 | 1.00 |
| Composite[b] | Mean | F4.1 | 592 | 50.75 | 2.81 | 62.80 | 33.40 |
| | S.D. | F4.1 | 592 | 8.04 | 1.41 | 12.90 | 0.00 |
| | N | F6.0 | 592 | 265.26 | 833.91 | 18591.00 | 1.00 |
| 4th grade 69-70 SES[c] | Mean | F4.1 | 579 | 48.40 | 3.22 | 65.20 | 37.80 |
| | S.D. | F4.1 | 579 | 1.16 | 1.36 | 5.70 | 0.00 |
| | N | F6.0 | 579 | 4.20 | 9.67 | 195.00 | 1.00 |
| Achievement attitude[c] | Mean | F4.1 | 579 | 48.97 | 2.29 | 56.90 | 38.30 |
| | S.D. | F4.1 | 579 | 0.96 | 1.04 | 4.90 | 0.00 |
| | N | F6.0 | 579 | 4.20 | 9.67 | 195.00 | 1.00 |
| Self attitude[c] | Mean | F4.1 | 579 | 49.47 | 2.23 | 58.00 | 37.40 |
| | S.D. | F4.1 | 579 | 0.99 | 1.10 | 5.40 | 0.00 |
| | N | F6.0 | 579 | 4.20 | 9.67 | 195.00 | 1.00 |
| School attitude[c] | Mean | F4.1 | 579 | 51.05 | 2.13 | 58.90 | 44.00 |
| | S.D. | F4.1 | 579 | 1.16 | 1.29 | 6.60 | 0.00 |
| | N | F6.0 | 579 | 4.20 | 9.67 | 195.00 | 1.00 |
| Vocabulary[c] | Mean | F4.1 | 585 | 50.64 | 2.73 | 65.50 | 41.90 |
| | S.D. | F4.1 | 585 | 1.11 | 1.25 | 6.00 | 0.00 |
| | N | F6.0 | 585 | 4.26 | 10.08 | 208.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 69-70 (cont.) | | | | | | | |
| Reading[c] | Mean | F4.1 | 585 | 50.99 | 2.68 | 62.20 | 42.80 |
| | S.D. | F4.1 | 585 | 1.13 | 1.30 | 5.70 | 0.00 |
| | N | F6.0 | 585 | 4.26 | 10.08 | 208.00 | 1.00 |
| English expression[c] | Mean | F4.1 | 585 | 50.93 | 2.78 | 58.60 | 42.00 |
| | S.D. | F4.1 | 585 | 1.15 | 1.29 | 5.50 | 0.00 |
| | N | F6.0 | 585 | 4.26 | 10.08 | 208.00 | 1.00 |
| Mathematics[c] | Mean | F4.1 | 585 | 50.80 | 2.97 | 61.20 | 39.90 |
| | S.D. | F4.1 | 585 | 1.16 | 1.29 | 5.40 | 0.00 |
| | N | F6.0 | 585 | 4.26 | 10.08 | 208.00 | 1.00 |
| Composite[c] | Mean | F4.1 | 585 | 50.92 | 2.66 | 60.70 | 41.60 |
| | S.D. | F4.1 | 585 | 1.09 | 1.23 | 5.40 | 0.00 |
| | N | F6.0 | 585 | 4.26 | 10.08 | 208.00 | 1.00 |
| 7th grade 69-70 SES[c] | Mean | F4.1 | 561 | 47.84 | 3.68 | 65.10 | 38.90 |
| | S.D. | F4.1 | 561 | 0.28 | 0.76 | 4.70 | 0.00 |
| | N | F6.0 | 561 | 1.59 | 4.60 | 106.00 | 1.00 |
| Achievement attitude[c] | Mean | F4.1 | 561 | 49.42 | 2.06 | 59.90 | 39.40 |
| | S.D. | F4.1 | 561 | 0.16 | 0.45 | 3.00 | 0.00 |
| | N | F6.0 | 561 | 1.59 | 4.60 | 106.00 | 1.00 |
| Self attitude[c] | Mean | F4.1 | 561 | 49.41 | 2.13 | 61.70 | 42.40 |
| | S.D. | F4.1 | 561 | 0.17 | 0.51 | 5.80 | 0.00 |
| | N | F6.0 | 561 | 1.59 | 4.60 | 106.00 | 1.00 |
| School attitude[c] | Mean | F4.1 | 561 | 51.73 | 2.74 | 62.00 | 41.90 |
| | S.D. | F4.1 | 561 | 0.24 | 0.69 | 4.20 | 0.00 |
| | N | F6.0 | 561 | 1.59 | 4.60 | 106.00 | 1.00 |
| Vocabulary[c] | Mean | F4.1 | 566 | 50.39 | 2.63 | 60.80 | 41.10 |
| | S.D. | F4.1 | 566 | 0.26 | 0.75 | 5.30 | 0.00 |
| | N | F6.0 | 566 | 1.61 | 4.82 | 112.00 | 1.00 |
| Reading[c] | Mean | F4.1 | 566 | 50.68 | 2.49 | 62.20 | 41.30 |
| | S.D. | F4.1 | 566 | 0.24 | 0.67 | 4.60 | 0.00 |
| | N | F6.0 | 566 | 1.61 | 4.82 | 112.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 7th grade 69-70 (cont.) | | | | | | | |
| English expression[c] | Mean | F4.1 | 566 | 50.69 | 2.67 | 62.70 | 40.50 |
| | S.D. | F4.1 | 566 | 0.25 | 0.71 | 5.50 | 0.00 |
| | N | F6.0 | 566 | 1.61 | 4.82 | 112.00 | 1.00 |
| Mathematics[c] | Mean | F4.1 | 566 | 50.97 | 2.88 | 63.50 | 39.60 |
| | S.D. | F4.1 | 566 | 0.26 | 0.74 | 5.20 | 0.00 |
| | N | F6.0 | 566 | 1.61 | 4.82 | 112.00 | 1.00 |
| Composite[c] | Mean | F4.1 | 566 | 50.79 | 2.55 | 62.80 | 40.80 |
| | S.D. | F4.1 | 566 | 0.24 | 0.68 | 5.00 | 0.00 |
| | N | F6.0 | 566 | 1.61 | 4.82 | 112.00 | 1.00 |
| Total state revenue per pupil (68-69) | | F7.1 | 629 | 315.47 | 75.58 | 793.50 | 5.40 |
| Title I ESEA per pupil (68-69) | | F7.1 | 493 | 14.12 | 12.63 | 99.80 | 0.60 |
| Total federal revenue per pupil (68-69) | | F7.1 | 556 | 23.37 | 29.11 | 390.90 | 0.10 |
| Special education instructional expense per pupil (68-69) | | F7.1 | 420 | 19.20 | 14.15 | 94.80 | 0.50 |
| Health expense per pupil (68-69) | | F7.1 | 474 | 1.71 | 2.46 | 20.10 | 0.10 |
| Transportation expense per pupil (68-69) | | F7.1 | 592 | 46.32 | 57.20 | 975.00 | 0.40 |
| Debt retirement levy (68-69) | | F7.0 | 490 | 52460.86 | 25304.07 | 220000.00 | 2500.00 |
| Building and site levy (68-69) | | F7.0 | 64 | 22326.56 | 16043.05 | 80000.00 | 1800.00 |
| General fund levy (68-69) | | F10.0 | 636 | 1131850.00 | | | |
| Average elementary teacher salary (68-69) | | F7.1 | 589 | 8573.93 | 1795.99 | 16340.50 | 49.00 |
| Average secondary teacher salary (68-69) | | F7.1 | 530 | 7963.55 | 1289.23 | 13327.20 | 2050.00 |
| Elementary instructional salary per pupil (68-69) | | F7.1 | 634 | 355.57 | 193.88 | 4662.00 | 131.60 |

Table C-2--Continued

| Variable Name | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|
| Secondary instructional salary per pupil (68-69) | F7.1 | 532 | 448.78 | 90.52 | 831.30 | 163.10 |
| Total instructional salary per pupil (68-69) | F7.1 | 634 | 405.09 | 195.59 | 4662.00 | 131.60 |
| No. teachers (68-69) | F7.0 | 592 | 146.40 | 439.29 | 9539.00 | 1.00 |
| No. elementary teachers (68-69) | F6.0 | 591 | 67.78 | 175.60 | 3564.00 | 1.00 |
| No. secondary teachers (68-69) | F6.0 | 540 | 78.21 | 236.73 | 5058.00 | 1.00 |
| % male teachers (68-69) | F5.1 | 565 | 37.32 | 9.87 | 100.00 | 11.10 |
| % out-of-state teachers (68-69) | F5.1 | 543 | 20.41 | 11.90 | 100.00 | 1.50 |
| T if tested in 70-71 | A1 | 613 | | | | |
| 4 if tested in 4th grade 70-71 | F1.0 | 612 | | | | |
| 7 if tested in 7th grade 70-71 | F1.0 | 585 | | | | |
| Total teachers' salary (69-70) | F12.0 | 615 | 1368040.00 | 4631570.00 | 104208000.00 | 3737.00 |
| No. teachers (69-70) | F7.0 | 617 | 137.27 | 419.70 | 9326.00 | 1.00 |
| Average salary (69-70) | F9.2 | 614 | 8881.76 | 1346.99 | 18845.68 | 3100.00 |
| Total operating expense (69-70) | F12.0 | 618 | 2541120.00 | 9695910.00 | 222135000.00 | 5589.00 |
| State aid membership (69-70) | F7.0 | 618 | 3501.05 | 12639.17 | 293822.00 | 3.00 |
| Operating expense per pupil (69-70) | F9.2 | 618 | 641.82 | 161.27 | 2482.00 | 232.66 |
| State equalized value (69-70) | F12.0 | 618 | 56754300.00 | 226978000.00 | 5188210000.00 | 252500.00 |
| Resident membership (69-70) | F7.0 | 618 | 3483.49 | 12584.95 | 292786.00 | 8.00 |
| State equalized value per resident pupil (69-70) | F9.2 | 618 | 15569.91 | 12878.45 | 249761.69 | 2231.27 |
| Local revenue (69-70) | F12.0 | 618 | 1517290.00 | 5619870.00 | 123051000.00 | 2815.00 |
| Local revenue per state aid member (69-70) | F9.2 | 618 | 376.35 | 225.31 | 3007.67 | 77.36 |
| State aid to district (69-70) | F12.0 | 610 | 1121800.00 | 3865000.00 | 89360800.00 | 860.00 |
| State aid to district per state aid member (69-70) | F9.2 | 610 | 326.17 | 85.92 | 562.90 | 18.68 |
| Total instructional expense (69-70) | F12.0 | 618 | 1930060.00 | 7473830.00 | 171442000.00 | 3902.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| Instructional expense per state aid member (69-70) | | F9.2 | 618 | 468.09 | 114.36 | 1609.00 | 189.96 |
| Instructional expense (part) (69-70) | | F12.0 | 617 | 1752240.00 | 6103760.00 | 137377000.00 | 3902.00 |
| Adjusted membership (69-70) | | F7.0 | 618 | 3442.93 | 12306.09 | 285641.00 | 3.00 |
| Instructional expense per adjusted membership (69-70) | | F9.2 | 617 | 452.70 | 105.17 | 1609.00 | 192.06 |
| No. of student dropouts (68-69) | | F7.0 | 510 | 76.32 | 484.02 | 10732.00 | 1.00 |
| Adjusted membership for dropouts (68-69) | | F7.2 | 518 | 10.77 | 33.76 | 719.00 | 0.01 |
| Dropout rate (68-69) | | F6.2 | 509 | 6.24 | 19.11 | 400.00 | 0.26 |
| Average teacher experience | | F7.2 | 594 | 9.65 | 3.65 | 35.00 | 1.00 |
| Pupils per staff (69-70) | | F6.2 | 618 | 21.56 | 3.33 | 47.00 | 3.00 |
| Pupils per teacher (69-70) | | F6.2 | 618 | 23.71 | 3.53 | 47.00 | 3.00 |
| % white students (69-70) | | F6.2 | 618 | 95.47 | 10.37 | 100.00 | 11.81 |
| % teachers over 5 yrs. experience (69-70) | | F6.2 | 603 | 57.58 | 16.73 | 100.00 | 16.67 |
| % teachers with Master's (69-70) | | F6.2 | 537 | 22.08 | 11.44 | 100.00 | 1.32 |
| % teachers with salary greater than $11,000 (69-70) | | F6.2 | 472 | 30.06 | 17.52 | 81.82 | 1.410 |
| 4th grade 70-71 Vocabulary[b] | Mean | F4.1 | 612 | 50.60 | 3.27 | 69.00 | 34.50 |
| | S.D. | F4.1 | 612 | 8.98 | 1.65 | 14.90 | 0.00 |
| | N | F6.0 | 612 | 261.95 | 895.39 | 20531.00 | 1.00 |
| Reading[b] | Mean | F4.1 | 612 | 51.11 | 3.05 | 63.00 | 38.00 |
| | S.D. | F4.1 | 612 | 8.68 | 1.71 | 12.00 | 0.00 |
| | N | F6.0 | 612 | 262.17 | 898.32 | 20608.00 | 1.00 |
| Mechanics of written English[b] | Mean | F4.1 | 612 | 50.63 | 3.29 | 66.00 | 35.00 |
| | S.D. | F4.1 | 612 | 8.89 | 1.47 | 13.60 | 0.00 |
| | N | F6.0 | 612 | 261.98 | 897.89 | 20599.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 70-71 (cont.) | | | | | | | |
| Mathematics[b] | Mean | F4.1 | 612 | 51.11 | 3.31 | 65.00 | 39.00 |
| | S.D. | F4.1 | 612 | 8.81 | 1.61 | 12.80 | 0.00 |
| | N | F6.0 | 612 | 261.47 | 891.13 | 20422.00 | 1.00 |
| Composite[b] | Mean | F4.1 | 612 | 50.97 | 2.98 | 64.00 | 38.50 |
| | S.D. | F4.1 | 612 | 8.01 | 1.44 | 12.00 | 0.00 |
| | N | F6.0 | 612 | 259.67 | 878.01 | 20089.00 | 1.00 |
| 7th grade 70-71 Vocabulary[b] | Mean | F4.1 | 585 | 50.44 | 2.91 | 63.00 | 39.70 |
| | S.D. | F4.1 | 585 | 9.04 | 1.36 | 17.00 | 0.00 |
| | N | F6.0 | 585 | 274.57 | 914.10 | 20635.00 | 1.00 |
| Reading[b] | Mean | F4.1 | 585 | 50.88 | 2.82 | 61.00 | 31.00 |
| | S.D. | F4.1 | 585 | 9.05 | 1.53 | 13.00 | 0.00 |
| | N | F6.0 | 585 | 274.68 | 913.53 | 20617.00 | 1.00 |
| Mechanics of written English[b] | Mean | F4.1 | 585 | 50.15 | 2.99 | 61.00 | 34.00 |
| | S.D. | F4.1 | 585 | 9.16 | 1.53 | 14.00 | 0.00 |
| | N | F6.0 | 585 | 274.68 | 913.64 | 20622.00 | 1.00 |
| Mathematics[b] | Mean | F4.1 | 585 | 51.26 | 3.21 | 3.50 | 38.00 |
| | S.D. | F4.1 | 585 | 8.90 | 1.50 | 16.50 | 0.00 |
| | N | F6.0 | 585 | 273.83 | 900.65 | 20286.00 | 1.00 |
| Composite[b] | Mean | F4.1 | 585 | 50.95 | 2.84 | 60.60 | 35.00 |
| | S.D. | F4.1 | 585 | 8.16 | 1.34 | 12.50 | 0.00 |
| | N | F6.0 | 585 | 270.69 | 877.27 | 19707.00 | 1.00 |
| 4th grade 70-71 Composite SES[b] | Mean | F4.1 | 609 | 49.54 | 3.16 | 66.00 | 30.00 |
| | S.D. | F4.1 | 609 | 8.60 | 1.71 | 12.30 | 0.00 |
| | N | F6.0 | 609 | 251.55 | 715.28 | 15595.00 | 1.00 |
| Achievement attitude[b] | Mean | F4.1 | 609 | 49.28 | 2.75 | 60.50 | 34.50 |
| | S.D. | F4.1 | 609 | 9.69 | 1.88 | 14.00 | 0.00 |
| | N | F6.0 | 609 | 251.48 | 714.07 | 15561.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 4th grade 70-71 (cont.) | | | | | | | |
| Self attitude[b] | Mean | F4.1 | 609 | 49.74 | 2.53 | 62.00 | 31.00 |
| | S.D. | F4.1 | 609 | 9.48 | 1.72 | 19.00 | 0.00 |
| | N | F6.0 | 609 | 251.45 | 713.63 | 15548.00 | 1.00 |
| School attitude[b] | Mean | F4.1 | 609 | 50.11 | 2.87 | 68.00 | 36.00 |
| | S.D. | F4.1 | 609 | 9.47 | 1.92 | 14.00 | 0.00 |
| | N | F6.0 | 609 | 251.38 | 712.62 | 15520.00 | 1.00 |
| 7th grade 70-71 Composite SES[b] | Mean | F4.1 | 582 | 50.01 | 2.94 | 61.80 | 34.00 |
| | S.D. | F4.1 | 582 | 8.53 | 1.71 | 13.30 | 0.00 |
| | N | F6.0 | 582 | 261.12 | 705.78 | 15092.00 | 1.00 |
| Achievement attitude[b] | Mean | F4.1 | 582 | 49.36 | 2.84 | 63.00 | 32.00 |
| | S.D. | F4.1 | 582 | 9.55 | 1.63 | 15.00 | 0.00 |
| | N | F6.0 | 582 | 260.99 | 703.35 | 15026.00 | 1.00 |
| Self attitude[b] | Mean | F4.1 | 582 | 49.47 | 2.28 | 59.30 | 34.00 |
| | S.D. | F4.1 | 582 | 9.58 | 1.67 | 17.50 | 0.00 |
| | N | F6.0 | 582 | 260.89 | 702.40 | 15000.00 | 1.00 |
| School attitude[b] | Mean | F4.1 | 582 | 50.42 | 2.63 | 65.00 | 26.00 |
| | S.D. | F4.1 | 582 | 9.38 | 1.61 | 13.00 | 0.00 |
| | N | F6.0 | 582 | 260.82 | 701.16 | 14967.00 | 1.00 |
| 4th grade 70-71 Friendly[b] | Mean | F4.1 | 609 | 51.03 | 2.61 | 66.70 | 31.50 |
| | S.D. | F4.1 | 609 | 9.11 | 1.77 | 17.00 | 0.00 |
| | N | F6.0 | 609 | 251.44 | 713.48 | 15544.00 | 1.00 |
| Family solidarity[b] | Mean | F4.1 | 609 | 50.95 | 2.66 | 60.00 | 21.00 |
| | S.D. | F4.1 | 609 | 8.63 | 2.18 | 18.00 | 0.00 |
| | N | F6.0 | 609 | 251.57 | 715.36 | 15597.00 | 1.00 |
| Educational-economic advantage[b] | Mean | F4.1 | 609 | 48.59 | 3.17 | 62.10 | 34.50 |
| | S.D. | F4.1 | 602 | 8.85 | 1.72 | 14.40 | 0.00 |
| | N | F6.0 | 609 | 251.59 | 715.41 | 15598.00 | 1.00 |

Table C-2--Continued

| Variable Name | | Format | No. Observations | Mean | Standard Deviation | Maximum | Minimum |
|---|---|---|---|---|---|---|---|
| 7th grade 70-71 Friendly[b] | Mean | F4.1 | 582 | 51.12 | 2.45 | 64.00 | 36.00 |
| | S.D. | F4.1 | 582 | 9.17 | 1.54 | 14.30 | 0.00 |
| | N | F6.0 | 582 | 260.89 | 701.85 | 14985.00 | 1.00 |
| Family solidarity[b] | Mean | F4.1 | 582 | 52.02 | 2.68 | 62.00 | 41.00 |
| | S.D. | F4.1 | 582 | 8.71 | 2.02 | 17.40 | 0.00 |
| | N | F6.0 | 582 | 261.19 | 706.30 | 15105.00 | 1.00 |
| Educational-economic advantage[b] | Mean | F4.1 | 582 | 48.18 | 3.77 | 64.20 | 32.50 |
| | S.D. | F4.1 | 582 | 8.70 | 1.48 | 15.50 | 0.00 |
| | N | F6.0 | 582 | 261.21 | 706.06 | 15098.00 | 1.00 |

[a]All missing values are either zero or blank.

[b]Based on number of pupils in district. That is, the district mean was obtained by averaging standard scores of all students in district taking an exam.

[c]Based on number of schools in district. School means, that is, were averaged within the district. If fewer than five students took any assessment battery, that school was omitted from calculation of the district score.

pupils in the public school district. (2) "Per resident pupil" or "per resident member" refers to all pupils residing in the district who attend school in that or any other district. It excludes pupils who attend school in the district but reside in another district, as well as pupils who attend private or parochial schools.

In the 1969-70 Educational Assessment Program, student assessment measures were computed *for the districts* in two different ways. First, the standard scores of all pupils in the district were averaged. Second, the scores of each school in the district were averaged. To reduce the unrepresentativeness that is inherent in a small sample size, schools with fewer than five students taking an assessment battery were excluded from the computation of district scores under the second method. In 1970-71 only the first method is reported.

Local Revenue per Pupil (1968-69 and 1969-70). The total value for local revenue allocated to the district included revenue from such scores as property tax, local government appropriations, tuition, transportation fees, revolving funds (revenue from food services, book stores, and student body activities), rent from school facilities, etc. Tuition received from community college patrons was not included in the calculation.

State School Aid per Pupil (1968-69 and 1969-70). The total value for state school aid includes all state grants received by the district.

Instructional Expense per Pupil (1968-69 and 1969-70). Instructional expense included all expenditures for salary and supplies connected with elementary, secondary, and special education; summer school; and adult education. Expenditures connected with community colleges were omitted from the calculation.

Total Operating Expense per Pupil (1968-69 and 1969-70). The total operating expense included, in addition to instructional expense, expenses connected with administration, attendance, health services, pupil transportation, plant operation and maintenance, and fixed charges. Community college expenses were not included.

State Equalized Value per Pupil (1968-69 and 1969-70). The total state equalized valuation is equal to approximately 50 percent of the "fair cash value" of the real and personal property in the district.

Total Instructional Expense (part) (1969-70). Excludes expenditures for special education, summer school, adult education, and community colleges.

Adjusted Membership (1969-70). Omits special education pupils.

Title I E.S.E.A. per Pupil (1968-69). This variable gives the per pupil amount of funds received by each school district under Title I of the Elementary and Secondary Education Act of 1965.

PERSONNEL DATA

The personnel data were received on four separate tapes, one each for the school years 1967-68, 1968-69, 1969-70, and 1970-71. These data have been combined to form a single tape, containing all non-redundant material from the original tapes. The data include information on age, sex, race,[1] educational background, location, and assignment for each of the four years.[2] Table C-3 includes a complete listing of all variables on the personnel tape. Information is reported for the 136,605 different teachers who were in the Michigan public school system at some time during the four years.

To determine the quality of the data, the records of those individuals whose last names begin with the letter "V" were examined in detail. Three recurring problems were found: (1) 0.4 percent of the teachers were found to have more than one record for a particular year. (2) 1 1/3 percent of the teachers (whose social security numbers were the same) had the coding for sex or year of birth change from one year to another. Individuals whose data exhibited either of these two problems were deleted from the entire data file. (3) In 0.5 percent of the cases, the social security number of what appears to be the same individual (on the basis of name, sex, and year of birth) changed from one year to another. The importance of this third type of problem is that, in the analysis of the data, records with different social security

[1]The race of the teacher was not reported in 1967-68; therefore, teachers who were not in the Michigan public school system after 1967-68 cannot be identified by race.

[2]Building assignment is reported only in 1970-71.

Table C-3

FORMAT OF PERSONNEL TAPE

| Variable Name | Format | Comments |
|---|---|---|
| Social security number | F9.0 | |
| Sex | F1.0 | 1 = M, 2 = F |
| Year of birth | F2.0 | Last two digits |
| Race | F1.0 | See code key |
| 1970 County code | F2.0 | |
| 1970 District code | F3.0 | |
| 1970 Building number | F4.0 | |
| 1970 Type certificate | A1 | See code key |
| 1970 Expiration year of certificate | F2.0 | Last two digits |
| 1970 Degree | F1.0 | |
| 1970 Taught full-time last year | F1.0 | 1 = yes, 0 = no |
| 1970 Assignment | A4 | |
| 1970 Level | F1.0 | See code key |
| 1970 Salary | F5.0 | |
| 1970 Total years of experience | F2.0 | |
| 1969 County code | F2.0 | |
| 1969 District code | F3.0 | |
| 1969 School class | F1.0 | |
| 1969 Grade range | A3 | |
| 1969 Type certificate | F1.0 | |
| 1969 Expiration year of certificate | F2.0 | |
| 1969 Degree | F1.0 | |
| 1969 Taught full-time last year | F1.0 | 1 = yes |
| 1969 Assignment | A4 | |
| 1969 Level | F1.0 | |
| 1969 Salary | F5.0 | |
| 1969 Total years of experience | F2.0 | |
| Repeat 1969 variables for 1968, 1967 | | |
| Latest institution code | F2.0 | |
| Latest major | A4 | |
| Latest minor | A6 | |
| Person in system in 1970 | F1.0 | 1 = yes, 0 = no |
| Person in system in 1969 | F1.0 | 1 = yes, 0 = no |
| Person in system in 1968 | F1.0 | 1 = yes, 0 = no |
| Person in system in 1967 | F1.0 | 1 = yes, 0 = no |

CODE KEYS FOR TABLE C-3

Sex

1 - Male
2 - Female

Race

1 - American Indian
2 - Caucasian
3 - Negro American
4 - Oriental
5 - Spanish American

Full Time Last Year

1 - Yes
2 - No

Degree

0 - None
1 - Bachelor's
2 - Master's
3 - Doctor's
4 - Specialist's

Type of Certificate

0 - Certificate not required (school social worker, psychologist, admin.)
1 - Elementary provisional
2 - Elementary permanent
3 - Secondary provisional
4 - Secondary permanent
5 - Life
6 - Full year permit (may be pending)
7 - State limited
8 - County limited
9 - Provisional or permanent pending
P - Substitute permit (person is being used in a full time position). Does not include any permit holders teaching on day-to-day substitute basis.

Level

0 - All grades
1 - Elementary (K-6 or K-8)
2 - Jr. high (7-8 or 7-9)
3 - Sr. high (9-12 or 10-12)
4 - Jr. - Sr. high
5 - Central Administration

numbers would be considered those of different individuals. An example will serve to illustrate the difficulty that this problem presents to a study dealing with teacher mobility. Suppose a teacher was assigned to a Michigan school district in 1967, 1968, and 1969. If that teacher's social security number is recorded erroneously in 1968, he will be counted as two separate individuals, one of whom left the district in 1968 and was rehired in 1969 and the other of whom was newly hired in 1968 and left the district in 1969. Records with this type of problem could not be eliminated from the file since there is no way to insure that records with the same name, sex, and year of birth, but different social security numbers, are indeed the same individual. Such insurance would require visual examination of the data, and with a file of more than 136,000 individuals, this would be an enormous undertaking. The frequency of the problem is low enough (0.5 percent) relative to that of teachers who move, terminate, or are newly hired that it should pose no major obstacles to a study of teacher mobility.

## II. DESCRIPTION OF THE TEACHER SAMPLE FILE

The analysis in this report is based on a stratified random sample of 15,758 teachers drawn from the more than 136,000 public school teachers employed in Michigan between the 1967-68 and 1970-71 school years. A sampling procedure was required by the large number of teachers in Michigan; inclusion of the full complement of Michigan teachers in the statistical calculations used for this study would be prohibitively expensive. Teachers were excluded from the sample if between 1967-68 and 1970-71 they were employed by a school district that did not have a kindergarten or 1st through 12th grade program. The sample was drawn as follows:

- 100 percent of all teachers who were in an administrative position in 1970-71, but in a regular or special teaching assignment in 1967-68.
- 25 percent of all teachers who taught in a diffe ent school district in 1970-71 than in 1967-68.
- 10 percent of all remaining teachers.

The first two groups are teachers who were promoted and teachers who transferred between school districts. These two categories were oversampled because of their small size and obvious importance to a study of teacher mobility. In computing the statistical results presented in this report, we assigned each sampled teacher a weight inversely related to his probability of being selected for the sample.

Each record in the teacher sample file contains information on a teacher's personal characteristics, assignment, and school district. These data are described below.

Personal Characteristics

The sample file includes information on the following characteristics: age, sex, race, most recent degree, and years of teaching experience. The data also indicate whether each teacher's latest degree is from a school outside Michigan, whether the teacher taught part-time during any period between 1966 and 1970, and whether the teacher's latest certificate is permanent or temporary. Salary information, which is updated annually, is reported in terms of contractual salary for the academic year (summer excluded). Supplementary money paid for such responsibilities as coaching is not included as part of the contractual salary, and part-time teachers' salaries are calculated on the basis of what they would have earned had they worked full time.

Assignment Information

The data indicate whether a teacher was employed by a Michigan public school system during each of the four school years between 1967-68 and 1970-71; and if he was, they identify the location and job content of his assignment during the year. The employment status information can be used to identify entries into and exits from the Michigan teacher personnel system. It is not possible to identify where entering teachers come from or why exiting teachers leave.

For each year a teacher is in the Michigan System, the information on assignment location and job content indicate (1) whether the teacher is a regular teacher, a special teacher, or an administrator; (2) whether he is located at a school or a district administration headquarters, and

if the former, the school level (senior, junior, or elementary); and (3) the district in which the teacher is employed. By comparing a teacher's assignment in two different school years, one can identify promotions, changes in teaching levels, interdistrict transfers, and several other types of moves.

District Characteristics

Each teacher has been assigned sets of values that quantitatively describe each district in which he taught. Unfortunately, although the Michigan Department of Education has provided us with considerable information on individual schools, we could not assign a teacher a set of values corresponding to each school in which he taught. A teacher's district is identified during each of the four years between 1967-68 and 1970-71, but the school at which he is assigned is identified only in 1970-71.[1] In fact, unless a move between schools also involves a change of teaching levels or districts, there is no way of knowing from the data that the move has even taken place. As indicated earlier, however, the results of an analysis of inter-school mobility within San Diego have been previously reported and can be used for purposes of comparison with the Michigan results.

The following district characteristic variables are used in this report:

Region. A set of dummy variables that identify the part of Michigan where the teacher's district is located:

(1) Detroit area (Wayne, Oakland and Macomb Counties);
(2) Southern Lower Peninsula (excluding the Detroit area);
(3) Northern Lower Peninsula;
(4) Upper Peninsula.

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[1]The Michigan Department of Education has recently collected teacher personnel information for 1971-72. These data, which were not available for use in this study, also identify each teacher's school. This information will allow future analysis of the influence of school characteristics on the mobility patterns of Michigan teachers.

Community Type. A set of dummy variables that indicate whether the district is in a

(1) large city (more than 50,000 inhabitants),

(2) small city (10,000 to 50,000 inhabitants),

(3) urban fringe (a community that has as its focal point a large or small city),

(4) town (2,500 to 10,000 inhabitants), or

(5) rural area (less than 2,500 inhabitants).

Size of District. We used three measures of district size:

(1) the number of students in the district in 1969-70;

(2) the number of teachers in the district in 1967-68; and

(3) the number of elementary schools in the district in 1969-70.

The coefficients of simple correlation among these three measures are above 0.99.

District Growth is measured as the percentage change in district enrollment between 1968-69 and 1969-70.

District Wealth is measured as state equalized value per resident pupil in 1969-70.

Class Size is measured as students per teacher 1969-70.

Student Characteristics. We used five different variables to measure the *average* characteristics of students within a district:

(1) the student dropout rate in 1968-69;

(2) the percent of white students in the district in 1969-70;

(3) student cognitive ability in reading, English expression and mathematics;

(4) student attitude toward school; and

(5) student socioeconomic status.

The last three measures are average district scores by 4th grade students on the 1970-71 Michigan Educational Assessment Battery. This battery is given annually on a statewide basis to 4th and 7th grade pupils and is used to obtain indices of basic skills, socioeconomic

background, and student attitudes. The indices have been scaled so that overall pupil means for the state always equal 50.[1]

Change in Student SES is measured as the absolute change in average student socioeconomic status between 1969-70 and 1970-71.

Improvement in Student Cognitive Ability is measured as the absolute difference in 1970-71 between 7th and 4th grade students' cognitive ability scores.

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[1]Only a few of the many indices of student characteristics that are available from the battery have been selected for use in this study. The others are described in the first section of this appendix.